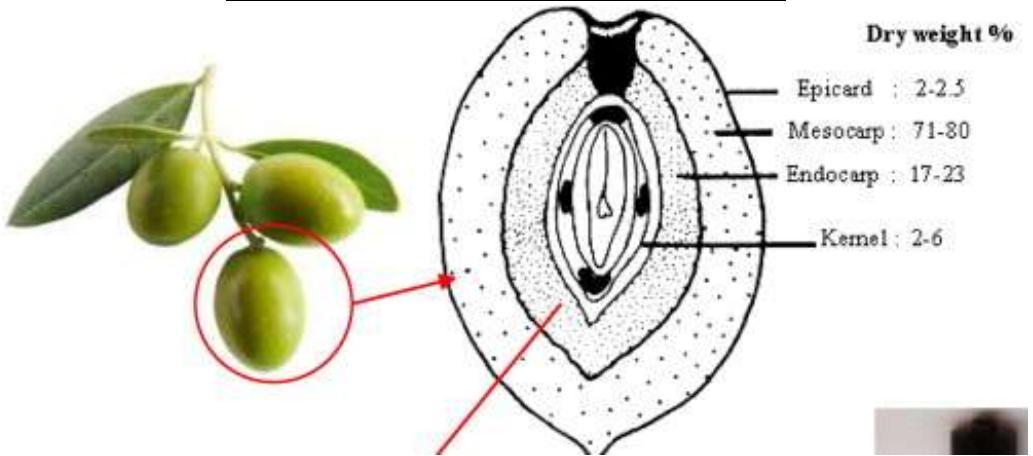


## LESSON NO. 2 OLIVE TREE & OLIVE OIL.



- **Basic encyclopedia of Olive tree & Olive oil:** -

The olive tree exist since 6000 B.C or much before. Its fruit & oil is been used since 3500 B.C or before; to destruct olive tree was not allowed since long. The Olive tree is mentioned in Quran &

Bible; for complete Quran & Hadith references read lesson on Olive on my website [www.tib-e-nabi-for-you.com](http://www.tib-e-nabi-for-you.com) or read my book part-2 lesson no. 40 Olive, page no. 82 onwards.

- **In Quran it is mentioned in following Sura/verses: -**

1. Chapter no. 6 (Sura) An'am verse no. 99
2. Chapter no. 6 (Sura) An'am verse no. 141
3. Chapter no. 16 (Sura) Nahl verse no. 11
4. Chapter no. 23 (Sura) Mu'minun verse no. 20
5. Chapter no. 24 (Sura) Noor verse no. 35
6. Chapter no. 80 (Sura) Abasa verse no. 29
7. Chapter no. 95 (Sura)Teen verse no. 1

In Chapter no. 24 (Sura) Noor verse no. 35 Allah Ta'lah has mentioned Olive tree as MUBARAK TREE this shows how blessed and precious the tree & its products are & we will learn why we should eat olive fruit & its oil & apply its oil on the body.

Come let's study what modern science has discovered about it till date. Let me tell you one thing that science has discovered very limited things & what it has discovered is very less & what is yet to discover it much more, science has not made or created anything it has only discovered and invented the creations of Allah & discovered or invented the things which Allah has made possible to invent or discover.

In Hadith of Prophet Muhammed (s.a.w) olive tree & its oil is mentioned; its tree is called as MUBARAK TREE in Hadith of Trimizi, Ibn ma-jah, please refer my book part-2 lesson no. 40 Olive, page no. 84 onwards. In Hadith it is said to eat olive oil & to massage with it; it is a good remedy for Juzaam & Basoor (both are deadly skin diseases since that time), piles & cure for 70 diseases, it is advised to use its oil with white costus & Memecylon in throat infection & pleurisy.

Read researches done on olive oil mentioned in my book in lesson no. 40 Olive in part-2. There are separate lessons in part-2 of my book on Memecylon, costus etc.

It is mentioned in following books of Hadith (reference are also given as Hadith number) Trimizi : 1851, 2222, 2223; Abu-Nuaim : 463 & 685; Ibn-Majah : 3444, 3445, 3596, 3575; Kanzul ummal : 28295.

Please visit my website [www.tib-e.nabi-for-you.com](http://www.tib-e.nabi-for-you.com) for detail Islamic study on Olive.

- **Olive tree: -**



The Olive tree is a member of ever green family; it is from Oleaceae family; its botanical name is Olea europaea; its strong roots can penetrate sand, lime stone & mostly all types of soils. The tree thrives best in regions with rainy winters & hot dry summers. It takes about 8 years to get the tree producing its fruits (olive). The tree lives for centuries; it is not very tall, its trunk is short, thick, irregular, twisted, light gray & full of bumps & cracks specially as it gets older. It flourishes around the month of May, during summer & autumn. Its tree are grown more in Spain, Africa, Mediterranean basin, china, Arabian Peninsula, California, Argentina etc.

- Leaves:-



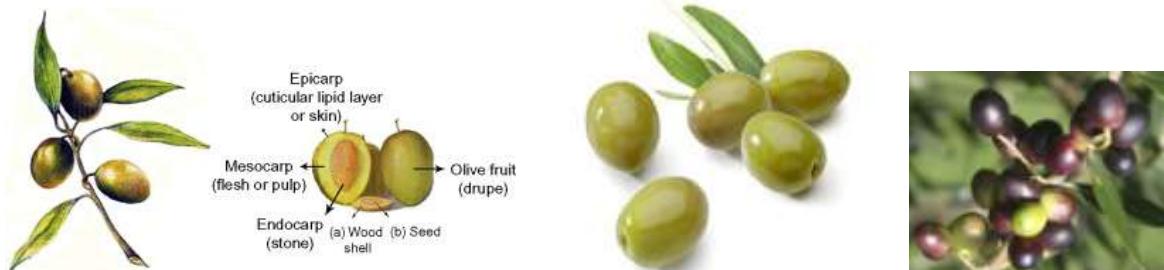
The olive leaves are arranged opposite to each other, they are lanceolate shaped (tapering to a point at the apex and at the base) up to about 8 cm in length, its edges are complete & leaves are attached by small stalk, the colour is whitish on the underside which aims to protect it from cold in winter & heat in summer & bright green colour on upper side.

- Flower:-



In last spring small flowers appear on olive tree; Flower (burrs) are very small & are clustered in inflorescences, they have 4 white petals & a strong fragrance, these petite flowers have the calyx & the corolla in one piece with very short tube & limb divided into 4 lobes.

- Fruits:-



Fruits are called olive; Wind pollination results in the blossoming of the olive fruit which reach their peak oil content approximately 6 months later, thus olive fruits are harvested from November to March. It is of green, reddish violet or black coloured depending on maturation & geographical region. Oil is expressed out from it; olive has one single seed (stone) of ovoidal shaped inside. Olives are of different sizes depending on the variety from which they come, usually range between 1.5 & 3 cm. They are of green colour at first, as they mature & ripen turns blackish or purple or copper brown coloured. It is believed the olives resemble the shape of ovaries & assist the health & function of ovaries (female reproductive organ).

- Olive Oil:-

Oil is expressed out from the ripe olive fruits, it requires 2000 olive fruits to express out 950ml of extra virgin olive oil. The bitter taste in it is mainly due to presence of Oleuropein in it, to reduce the bitterness the fruits are flushed with warm water & rinse in cold water before expressing oil from it.

### **How Olive oil is expressed out: -**

The ripen olives are collected & stored in a clean place & kept for a particular period to make the olives properly ripe but avoiding them from getting fermented, then it is flushed with warm water followed by rinse in cold water to reduce its bitter taste. Then it is crushed in machines the crushed material is then milled in machine to form a homogenized paste, and this paste is send for cold pressing to extract oil from it (the term cold pressing refers to that the oil is extracted out without heating the paste), then the paste is loaded on disk or in hemp pressing bags these disk or bags are kept in hydraulic pressing machine & tons of hydraulic pressure is given on stalks of the hemp bags loaded with the olive paste & oil is extracted out & the pulp remains in the bags. This is extra virgin olive oil expressed out in first pressing, it has less than 1% of acid in it, if the acidity is more than 2% then this oil is virgin olive oil though both are expressed out form 1<sup>st</sup> pressing, in this about 70% to 90% ingredients get extracted out in the oil. Then water is separated from the oil extracted out with centrifuge machine specially design for it, the water will be floating at the top of the oil after centrifuge cycle & the water is separated (Remember olive fruits are first flushed with warm water & rinse in cold water to reduce the bitter taste, but the water it to be removed), the colour of this oil may be deep-green or yellowish-green colour, later this oil is packed in different size bottle to market it.

Further more pressing cycles are done in different method to extract more oil from the remaining pulp its detail is given below in types of oil available in the market.

### **Types of Olive oil available in market: -**

**Extra virgin olive oil:** - it is extracted out from the first cycle cold pressing method as mentioned above, in it no solvent & chemicals are used, the PH (acidity) is low from 0.225 to 0.80, in it the taste & odour of olive fruit is present.

**Virgin olive oil:** - same as above only the PH (acidity) is more than 2% (higher than extra virgin oil). Refined olive oil: - it is taken out from the remaining pulp of first cold press this will be 2<sup>nd</sup> pressing cycle, in it solvents & chemicals are used to make pulp clean & pure also the pulp is boiled to remove oil from it.

**Pomace olive oil:** - in it seeds, skin, remaining pulp from the 2<sup>nd</sup> pressing is used, this will be the 3<sup>rd</sup> pressing cycle to remove oil.

**Lampante olive oil:** - it is not used for human, in it bad rotten olive fruits are used to express the oil & no refine process is done. It has high levels of acidity in it, it is mostly from the 1<sup>st</sup> pressing, the name Lampante comes from its use as burning lamps in olden days, it is used for animals, industries & etc, but it is not edible (not eatable).

- Quality control: -**

Olive oil is regulated by FDA (Food & Drug Administration); In 1995 FDA reported that only 4% of the 73 domestically produced or distributed olive oil was pure. American olive oil association reported that the 300 olive oil they test each year only a handful are found to be impure.

- Future: -**

New methods are in invention to exact out olive oil by centrifugation method or other method to press the oil out & to remove water from it. (Remember olive fruits are first flushed with warm water & rinse in cold water to reduce the bitter taste but the water it to be removed). The new methods will require less time, space, money & etc, also the pressing bags will not be used in new method because it needs to be washed properly after every pressing which is again time & money consuming.

### **Properties & uses of olive oil: -**

It is one of the most digestible edible oil, it is worlds 3<sup>rd</sup> best selling oil for cooking, frying also used directly as natural medicine to maintain health, used in cosmetic products, used for massaging the

body for complexion and maintain skin health. Extra virgin is very costly comparing to other types of olive oil but it is the best to be used though others type can be used as well. It is used as dressing oil in salads, applied on wounds, post operative wounds, applied on hairs & etc.

Its melting point is 6.0 degree Celsius, boiling point is 700 degree Celsius, smoke point is 190 degree Celsius, specific gravity is 0.911 (density of a substance divided by density of water) (density means a amount of matter in an object compare with its volume), viscosity (thickness) is 84 (cP), acid value is 0.8 in extra virgin, 1 to 2 in virgin & 6.6 in refined & pomace oil.

- **Adulteration:** -

Colza oil (Rape seed oil) is used to cheat the market.

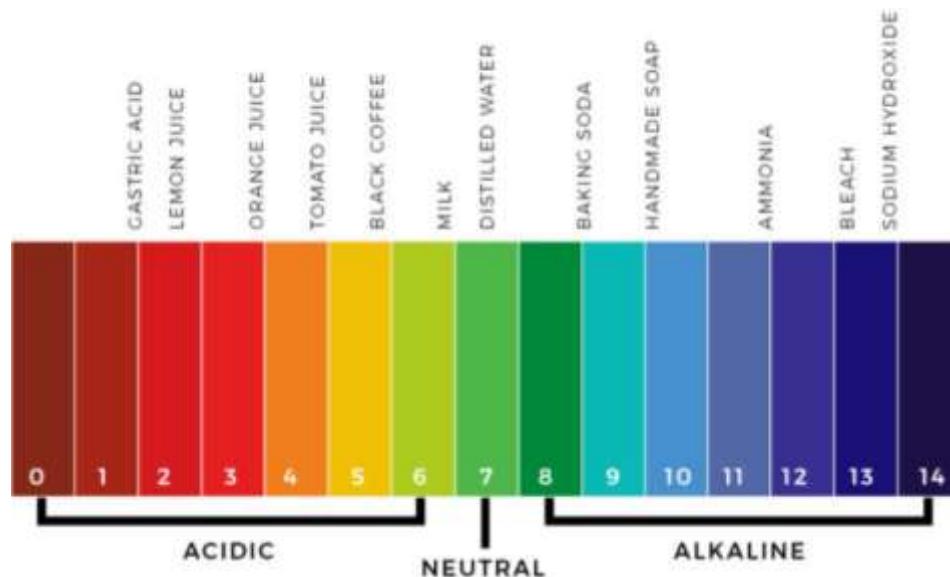
- **pH of olive oil:** -

Its pH is 3.6 & olives have pH of 6.0 to 7.0; its oil is acidic & olive is very less acidic, this is rough estimate because only aqueous solutions have pH levels, vegetable oil has no pH value. Likewise, other oils such as animal and petrochemical oils also have no pH value. Fatty acids are organic molecules often found in foods, including vegetable oils.

**pH** is a measure of hydrogen ion concentration, a measure of the acidity or alkalinity of a solution. The **pH** scale usually ranges from 0 to 14. Aqueous solutions at 25°C with a **pH** less than 7 are acidic, while those with a **pH** greater than 7 are basic or alkaline & 7 is neutral.

The pH of pure water is 7. In general, water with a pH lower than 7 is considered acidic, and with a pH greater than 7 is considered alkaline. The normal range for pH in surface water systems is 6.5 to 8.5, and the pH range for groundwater systems is between 6 and 8.5. We can add normal water to reduce the acidity.

It is Sunnat of Prophet Muhammed (s.a.w) to mix acidic with Alkaline to make it neutral or less acidic that why He use eat dates with watermelon or cucumber or dry dates with little butter; so you can mix one acidic with alkaline; also it is Sunnat to drink honey mixed in water; also dates or raisins soaked in water over night & drink the syrup (sharbat). Remember do not soak dates & raisin together at one time; soak at separate time & drink.



- **Calories:** - 1 teaspoon of olive oil contains 40 calories. 100 gram contains 884 calories.

- **Glycemic index & Glycemic load of olive:** -

Olives have a low glycemic index value of 15. For 3.5 ounces of olives, you have 3 grams of carbs and 2 grams of dietary fiber, which ends in just 1 g of carbs to be broken down into sugar.

A food is considered to have a low Glycemic index (GI) if it is 55 or less; mid-range GI if 56 to 69 & high GI if 70 or more. Glycemic index is a number. It gives you an idea about how fast your body converts the carbs in a food into glucose.

A low Glycemic load (GL) is between 1 and 10; a moderate GL is 11 to 19; and a high GL is 20 or higher. For those with diabetes, you want your diet to have GL values as low as possible.

The glycemic load (GL) of food is a number that estimates how much the food will raise a person's blood glucose level after eating it. Glycemic load accounts for how much carbohydrate is in the food and how much each gram of carbohydrate in the food raises blood glucose levels.

- **Health benefits & indications of extra virgin olive oil:** -

Extra virgin olive oil is useful in following diseases & conditions:- cardiovascular disease, Alzheimer's, nervous diseases, cancers, colon cancer, breast cancer, prostate cancer, makes blood pressure normal, reduces inflammation (swelling), reduces cholesterol, triglycerides, L.D.L, oxidative stress, blood sugar in diabetes, good for bones & joints, anti thrombotic (heals thrombosis), good for all skin diseases, best for aging, complexion, hairs, nails, muscles, liver, lungs, kidneys, spleen, pancreas & their related diseases, also best for gall bladder disease, gall stones, intestinal disease, gastric ulcers, gastritis, dental problems & much more.

- **Modern uses of olive oil:** -

**For Complexion:** -

Take  $\frac{1}{4}$  cup yogurt,  $\frac{1}{4}$  cup of pure honey, 2 tea spoon extra virgin olive oil, mix all properly & apply on face, leave for 20 minute & wash with warm water. (Apply it once or twice a week at night time).

Eat 7 pieces of watermelon daily on empty stomach early morning with 1 table spoon of honey daily for 11 days than alternative 11 days than once a week for 11 weeks. Rub watermelon & little extra virgin olive oil in the morning on face & cucumber & little extra virgin olive oil at evening daily for 15 days then alternative days for 40 days wash your face with luke warm water after 15 minutes.

**For aging:** -

2 tea spoon of extra virgin olive oil, 1 table spoon of lemon juice, a pinch of sea salt, first apply a little extra virgin olive oil on face & mix the lemon juice, olive oil & sea salt properly & apply on face leave it for 20 minute & wash with warm water (apply this once or twice a week).

**For hair:** -

Take  $\frac{1}{2}$  cup extra virgin olive oil, 2 table spoon of pure honey & one egg, mix all together properly & apply on hair leave it for 20 minute & wash off with luke warm water & follow up with hair conditioner. Do it once a week.

**For general health:** -

Take 1 table spoon of extra virgin olive oil, 1 table spoon of pure honey & 3 pinch of black caraway (kalonji) powder, mix together all three & lick & drink 1 cup water on it, early morning empty stomach & bed time. Massage full body once a week at night & take bath in morning with warm water. Put 3 drops in both nostrils 3 times a week at night while sleeping.

According to researches eating 2 table spoon of extra virgin olive oil everyday reduces risk of many types of cancer & heart diseases.

Take extra virgin olive oil with fresh salad or fruits because they are of opposite qualities & nutrition facts & eating together both get neutralized & it is Sunnah to eat a neutralized food, example it is Sunnah to eat cucumber with dates or watermelon with dates or butter with dried dates. Refer lesson dates, cucumber & watermelon in my book part-2.

**For irritable bowel syndrome:** -

Give enema per rectum of extra virgin olive oil, 1<sup>st</sup> 3 days 10ml twice a day followed by 15 ml for more 3 days followed by 21 ml for 34 days enema should be taken by an expert only who knows to give enema or refer YouTube video on how to give enema per rectum.

**For gall stones & pancreatic disease of all types:** -

7 drops of fresh lemon juice, 1 table spoon of extra virgin olive oil & 1 table spoon of pure honey, mix together & lick, drink 1 cup water on it, take early morning empty stomach, evening & bed time.

Olive oil is the best natural oil to be used, its tree is referred as MUBARAK by ALLAH (The Almighty) in QURAN by this we can imagine the importance of it. We should use it in cooking, frying, eating, massage etc regularly.

#### **For Blood pressure: -**

Eat 7 pieces of watermelon with 1 teaspoon of extra virgin olive oil, early morning before 7.00 am & evening 5.30 pm (lick olive oil first and eat watermelon); do not leave your blood pressure medicine suddenly but monitor the blood pressure daily & consult your doctor or leave the medicine gradually if blood pressure is normal continuously & monitor it daily after leaving the medicines if your BP is normal, continue taking watermelon & olive oil.

#### **For acidity & cardiac (heart) health: -**

Lick one table spoon of extra virgin olive oil, 1 spoon of honey, 1 spoon of aloe vera gel & drink 1 cup water on it, empty stomach morning & evening 6.00 pm for 15 days or more.

- **Contents/constituents of extra virgin olive oil & olive fruit: -**

All contents may not present in all types of it, because there are many varieties of it according to geographical regions & content may differ a lot as per cultivation, soil, seed, climate etc.

The contents in refined & pomace olive oil have lesser amount of quantity & quality.

Oleic acid, Oleanolic acid, linoleic acid, palmitic acid, stearic acid, syringic acid, sterols, phenols (like hydroxytyrosol, tyrosol, oleuropein), natural triacylglycerol (triglycerides), squalene, chlorophyll, carotenoid, protocatechuic acid, hydroxybenzoic acid, vitamin A, E, D, K and in mild ratio calcium, zinc, iron, copper, manganese, selenium, amino acids, folic acid, vitamin B1, B2, B3, B5, B6, B12, sodium, potassium, carbohydrate, triterpenes & there are more than 200 minor components in extra virgin olive oil.

**Active ingredient of olive oil is oleic acid, phenolic constituents, squalene.**

#### **Micro ingredients of extra virgin olive oil: -**

Are Flavonoids, sterol, glycerol, phosphatide, oleuropein, oleocanthal, carotenoid, beta sitostanol, beta carotene, cryptoxanthin, lutein-zeaxanthin, phytosterols, chloride etc.

A good quality olive fruit contains little amount of amino acids mentioned in table below: -

The above ingredients are based on scientific study, means these has been indentified, known & learnt by modern science, it does not means that it contains only these ingredients, there may be many more ingredients which are yet to be discovered, learnt & known by modern science.

| Amino acids                  | Fresh olive fruit |
|------------------------------|-------------------|
| Weight (g)                   | 8 grams           |
| Tryptophan(mg)<br>(% RDI)    | ~<br>(~%)         |
| Threonine(mg)<br>(% RDI)     | 2<br>(0%)         |
| Isoleucine(mg)<br>(% RDI)    | 3<br>(0%)         |
| Leucine(mg)<br>(% RDI)       | 4<br>(0%)         |
| Lysine(mg)<br>(% RDI)        | 3<br>(0%)         |
| Methionine(mg)<br>(% RDI)    | 1<br>(0%)         |
| Cystine(mg)<br>(% RDI)       | ~<br>(~%)         |
| Phenylalanine(mg)<br>(% RDI) | 2<br>(0%)         |
| Tyrosine(mg)<br>(% RDI)      | 2<br>(0%)         |
| Valine(mg)<br>(% RDI)        | 3<br>(0%)         |
| Histidine(mg)<br>(% RDI)     | 2<br>(0%)         |
| Arginine(mg)                 | 6                 |
| Alanine(mg)                  | 4                 |

|                   |   |
|-------------------|---|
| Aspartic acid(mg) | 8 |
| Betaine(mg)       | ~ |
| Glutamic acid(mg) | 8 |
| Glycine(mg)       | 4 |
| Proline(mg)       | 3 |
| Serine(mg)        | 3 |

- **Natural Basic Pharmacology of extra virgin olive oil based on human intake in natural food products:** -

The details given below are based on natural ingredients found in extra virgin olive oil and not synthetically prepared, for example oleic acid is found naturally in olive oil but is also prepared synthetically, here we are learning about natural form: -

- **Oleanolic acid:-**

It is also called oleanic acid. It is naturally occurring pentacyclic triterpenoid recreated to betulinic acid. It is present in olive oil, marjoram, jujube, fruit peel, olive leave and olive fruit. It is anti-inflammatory, antioxidant, reduce lipids, anti-cancer, modulate immune response.

- **Phosphatide: -**

It is also called as phospholipid; it is any member of a large class of fat like phosphorus that contains substances that play important structural & metabolic roles in living cells. Lecithin is among it.

**Main sources of Phosphatide: -**

Egg, fish, milk, chicken, soya, sunflower oil etc.

**Basic pharmacokinetics of Phosphatide (based on human intake in natural food products): -**

The first step in the digestion of triglycerides and phospholipids begins in the mouth as lipids encounter saliva. Next by chewing action of emulsifiers enables the digestive enzymes to do their tasks. The enzyme lingual lipase, along with a small amount of phospholipid as an emulsifier, initiates the process of digestion & its digestion becomes easy; As a result, the fats become tiny droplets and separate from the watery components. In the stomach, gastric lipase starts to break down triglycerides into diglycerides and fatty acids. Within two to four hours after eating a meal, roughly 30 percent of the triglycerides are converted to diglycerides and fatty acids. The stomach's churning and contractions help to disperse the fat molecules, while the diglycerides derived in this process act as further emulsifiers. However, very little fats digestion occurs in the stomach. As stomach contents enter the small intestine, the digestive system sets out to manage a small hurdle, namely, to combine the separated fats with its own watery fluids. The solution to this hurdle is bile. Bile contains bile salts, lecithin, and substances derived from cholesterol so it acts as an emulsifier. It attracts and holds onto fat while it is simultaneously attracted to and held on to by water. Emulsification increases the surface area of lipids over a thousand-fold, making them more accessible to the digestive enzymes. Once the stomach contents have been emulsified, fat-breaking enzymes work on the triglycerides and diglycerides to sever fatty acids from their glycerol foundations. As pancreatic lipase enters the small intestine, it breaks down the fats into free fatty acids and monoglycerides. Yet again, another hurdle presents itself. How will the fats pass through the watery layer of mucus that coats the absorptive lining of the digestive tract? As before, the answer is bile. Bile salts envelop the fatty acids and monoglycerides to form micelles. Micelles have a fatty acid core with a water-soluble exterior. This allows efficient transportation to the intestinal microvillus. Here, the fat components are released and disseminated into the cells of the digestive tract lining.

Just as lipids require special handling in the digestive tract to move within a water-based environment, they require similar handling to travel in the bloodstream. Inside the intestinal cells, the monoglycerides and fatty acids reassemble themselves into triglycerides. Triglycerides, cholesterol, and phospholipids form lipoproteins when joined with a protein carrier. Lipoproteins have an inner core that is primarily made up of triglycerides and cholesterol esters (a cholesterol ester is cholesterol linked to a fatty acid). The outer envelope is made of phospholipids interspersed with proteins and cholesterol. Together they form a chylomicron, which is a large lipoprotein that

now enters the lymphatic system and will soon be released into the bloodstream via the jugular vein in the neck. Chylomicrons transport food fats perfectly through the body's water-based environment to specific destinations such as the liver and other body tissues.

Cholesterols are poorly absorbed when compared to phospholipids and triglycerides. Cholesterol absorption is aided by an increase in dietary fat components and is hindered by high fiber content. This is the reason that a high intake of fiber is recommended to decrease blood cholesterol. Foods high in fiber such as fresh fruits, vegetables, and oats can bind bile salts and cholesterol, preventing their absorption and carrying them out of the colon.

If fats are not absorbed properly as is seen in some medical conditions, a person's stool will contain high amounts of fat. If fat malabsorption persists the condition is known as steatorrhea. Steatorrhea can result from diseases that affect absorption, such as Crohn's disease and cystic fibrosis.

#### **Basic clinical pharmacology of phosphatide: -**

It promotes cardio vascular health, improves liver & cell function, act on transport of fats & metabolism, helpful in child health, physical performance, muscles function, cell communication, improves memory, hair & nail health, relief arthritis, treat gall stones.

#### **• Oleic acid: -**

Its short hand notation is C18:1, it is a non essential (means it is produced naturally in the body) monounsaturated omega 9 fatty acid, it makes up 55% to 85% or more of extra virgin olive oil, It is insoluble in water & soluble in alcohol. It increases absorption of many drugs through skin by disrupting the lipids under the skin and penetration of the drugs, so olive oil is best to be used with other applications on skin and used in cosmetic formulas. It is advised in Hadith to eat it & massage with it just notice the importance of it.

#### **Main sources of oleic acid: -**

It is present in extra virgin olive oil is the best, also present in avocado oil, camellia oil, shea nut oil, apricot oil, sweet almond oil, whole egg, nuts, argan oil etc.

#### **Basic pharmacokinetics of oleic acid (based on human intake in natural food products): -**

It is believed that it is absorbed by different tissues mediated via passive diffusion to facilitate diffusion (this is under research) after taken up by the tissues it is stored in the form of natural triglycerides or oxidized, it is transported by lymphatic system; it is also believed to penetrate through skin (it is under research), its excretion is in stool. It is stored 98% in adipose tissues depots in form of triglycerides. Its metabolism & plasma half life is yet not known.

#### **Basic clinical pharmacology of oleic acid: -**

It increases bioavailability of following medicines cortisol, hydrocortisone, betamethasone, 17 benzoate betamethasone, 17 valerate (betamethasone), ketorolac (anti inflammatory), metronidazole, progesterone & estradiol. So I advised to mixed powder of prednisolone mixed in extra virgin olive oil and apply on eczema & psoriasis and get good results in cheaper rates.

Oleic acid prevents cardio vascular disease, blood pressure, skin disease, breast cancer, colon cancer, prostate cancer, stomach cancer, diabetes, gall stones, gastrointestinal disease and pancreatic disease. It reduces cholesterol, triglycerides, LDL, inflammation, swelling etc.

#### **• Phenolic constituents of extra virgin olive oil: -**

The main phenolic includes hydroxytyrosol, tyrosol, oleuropein, they are well absorbed in human body, they preserve the olive oil for longer period, presence of them makes the olive oil bitter (so extra virgin olive oil is more bitter) and they are present in olive leaves, fruits thus present in olive oil also (speacially oleuropein). It is semi water soluble.

#### **Main sources of phenolic constituents: -**

It is present in extra virgin olive oil mainly & also cuphea oil.

#### **Basic pharmacokinetics of phenolic constituents (based on human intake in natural food products): -**

They are absorbed extensively & modified in the body & excreted in urine (but it is in research & the complete metabolism will be known after the research). Its storage in the human body is not known.

#### **Basic clinical pharmacology of phenolic constituents: -**

They are powerful anti-oxidant (prevent cancer and deadly disease) by acting as a free radicals scavengers & radical chain breaker. It prevents heart disease (reduces cholesterol & LDL & prevent hardening of heart arteries-atherosclerosis), metabolic disease, diabetes, cancers of many types (it acts on anti-oncogenic pathway thus the growth of tumour cells & cancer cells is inhibited), they protect the brain damage; they are anti-microbial specially bacteria of lungs & intestines. They are also metal chelator (metal stabilizer & make metal soluble).

#### **• Triterpenes: -**

It is a natural group of plant product (saponins); it is of two types simple & complex, simple are components of surface waxes & specialized membranes & act as signaling molecules; complex are glycosylated & provide protection to the plant against pathogen & pests.

#### **Main sources of Triterpenes: -**

Olive oil, olive leaves, olive fruits, rosemary, cucumber, it is present in plant surface such as stem bark, leaf, fruit waxes of many plants specially of Lamiaceae family.

#### **Basic pharmacokinetics of Triterpenes (based on human intake in natural food products): -**

Before absorption it is hydrolyzed by intestinal enzymes or by bacterial enzymes in large intestine and absorbed; it has low absorption rate; not much is known about its digestion.

#### **Basic clinical pharmacology of Triterpenes: -**

It is anti tumour, anti viral, anti bacterial, anti oxidant, anti diabetes, cardio protective, anti obesity, anti cancer, anti ulcer, anti inflammatory, immune-modulator, resolve immune diseases.

#### **• Squalene: -**

It is a natural organic compound obtained from olive oil or shark liver oil.

#### **Main sources of squalene: -**

It is present in extra virgin olive oil, soybean oil, grape seed oil, peanut, rice, wheat germ, corn, shark liver oil etc.

#### **Basic pharmacokinetics of squalene (based on human intake in natural food products): -**

Squalene is better but slowly absorbed through skin & poorly through intestines. Its absorption, metabolism & excretion are not known yet, it is under research.

#### **Basic clinical pharmacology of squalene: -**

Squalene is best of skin diseases, (specially psoriasis, eczema & inflammatory skin diseases) it promotes skin health & complexion (thus olive oil is ideal for skin) it has anti cancer activity also. It is a strong anti-oxidant thus prevents the skin from UV damages & aging because it is a good skin moisturizer. It is also an anti-bacterial thus heals wound & ulcer on skin.

#### **• Linoleic acid: -**

It is a carboxylic acid, it make up 3% to 15% of extra virgin olive oil, It is polyunsaturated with omega 3 & 6 fatty acids; its short hand notation is 18:2, it is an essential fatty acid that must be consumed for health.

#### **Main sources of linoleic acid: -**

It is present in olive oil, evening primrose oil, sunflower oil, walnut oil, hemp oil, grape seed oil, safflower oil, egg yolk, butter & etc.

#### **Basic pharmacokinetics of linoleic acid (based on human intake in natural food products): -**

It is first hydrolyzed from dietary fats & pancreatic enzymes & then with the help of bile it is absorbed in small intestine; metabolism & excretion are under research.

It gets converted into gamma linoleic acid (GLA) in the body, GLA is converted in the body into dihomo GLA (20 carbon chain) & it is converted into Arachidonic acid which is converted into Docosatetraenoic (long chain fatty acid with 22 carbons) acid.

#### **Basic clinical pharmacology of linoleic acid: -**

It acts on prostaglandin system of the body thus is anti-inflammatory, blood thinner, vasodilator (expand the blood vessel) it is very helpful in treatment of rheumatoid arthritis, breast lumps, fibroadenoma (nodes in breast), cancers, reduces cholesterol, it prevents heart disease, diabetes, skin ulcers, irritable bowel syndrome etc.

- **Palmitic acid: -**

It makes up 7% to 13% of extra virgin olive oil; it is a common saturated fatty acid; it is the first fatty acid produced during lipogenesis (fatty acid synthesis) & from which longer fatty acids can be produced.

#### **Main sources of palmitic acid: -**

It is present in olive oil, flaxseed oil, soyabean oil, sunflower oil, palm oil, cocoa butter, meat, milk & etc.

#### **Basic pharmacokinetics of palmitic acid (based on human intake in natural food products): -**

Its absorption, metabolism & excretion are under research.

#### **Basic clinical pharmacology of palmitic acid: -**

It softens the skin & keeps it moist thus good for psoriasis & eczema. It coats the skin, it is powerful anti-oxidant; it maintains the health of hair & skin from aging, cleans them from dirt, sweat, excessive sebum (main cause of acne and boil on face & other parts of the body).

- **Stearic acid: -**

It makes up 0.5% to 5 % of extra virgin olive oil; it is saturated fatty acid.

#### **Main sources of stearic acid: -**

It is mainly present in olive oil, also present in butter, whole milk, yeast bread, egg & etc.

#### **Basic pharmacokinetics of stearic acid (based on human intake in natural food products): -**

Its absorption, metabolism & excretion are under research.

#### **Basic clinical pharmacology of stearic acid: -**

It cleans the skin & removes dirt, sweat & excessive sebum from skin & hair. The colour of olive oil is due to pigments of stearic acid like chlorophyll, pheophytin & carotenoid that's why extra virgin olive oil has colour of its own which refined & pomace do not have.

- **Protocatechuic acid: -**

It is a dihydroxybenzoic acid (a type of phenolic acid); it is structurally similar to gallic acid, caffeic acid, vanillic acid & syringic acid; it well known antioxidant, anti-inflammatory, anti bacterial, anticancer, anti ulcer, anti-ageing, antiviral, analgesic, protects liver, heart, brain & nerves; it is mainly present in green tea, bran & grains, almond, olive oil, star anise, plums, rosemary, Japanese ginko biloba.

- **Hydroxybenzoic acid: -**

It is a monohydrobenzoic acid, a phenolic white crystalline solid compound; it is mainly present in genus vitex, agnus castus, hypericum perforatum ,spongiochloris spongiosa (fresh water green alga), green tea, acai oil, cloudy olive oil, (unfiltered) edible mushroom; it has estrogenic activity, it is used as a preservity, parabens is its esters.

- **Syringic acid: -**

It is a naturally occurring Trihydroxybenzoic acid or dimethoxybenzoic acid; it has a role as a plant metabolite, it is a member of benzoic acid & phenols; it can be derive from gallic acid; it is anti-

diabetic, it is present in wheat, maize, oats, rice, dates, apple, grapes, olive oil, rape, seed oil, thyme, marjoram, vinegar, walnut etc.

- **Vitamin K:** -

It is a fat soluble vitamin; it is essential for normal blood clotting; it occurs naturally in two forms, vitamin K1 (phylloquinone) which is widely distributed in plants; it is present in olive oil; Leafy vegetables are good sources of K1; vitamin K2 (menaquinones) is synthesized in alimentary tract by bacteria (*Escherichia coli* & other bacteria).

**Main sources of vitamin K1:** -

It is present in olive oil & also present in green leafy vegetables (spinach, kale etc) cauliflower, cabbage, broccoli, sprout, fish, liver, meat, egg, cereals etc.

**Basic pharmacokinetics of vitamin k (based on human intake in natural food products):** -

It is absorbed in small intestine, bile is required for its absorption & stored in fatty tissues & liver; it is excreted 40% to 50% in stools & 30% to 40% in urine.

**Basic clinical pharmacology of vitamin K:** -

It acts on synthesis of certain proteins that are prerequisites (necessary) of blood coagulation (means act to stop bleeding) & body also needs it to control the binding of calcium in bones & other tissues. Deficiency of it makes bones weaker, calcification of arteries & other tissues thus take care of bones, joints & heart; it reduces tumour growth & is helpful in cancers.

- **Vitamin E:** -

It is fat soluble vitamin; it is a group of eight fat soluble compounds that includes four tocopherols & four tocotrienols.

**Main sources of vitamin E:** -

It is present in olive oil, almonds, cereals, wheat germ, sunflower oil, corn oil, soybean oil, peanuts, green leafy vegetables & etc.

**Basic pharmacokinetics of vitamin E (based on human intake in natural food products):** -

It is absorbed in small intestines & metabolized in liver & distributed through lymphatic system & stored in fat droplets of adipose tissue cells; it is mainly excreted in stool, little in urine & through skin.

**Basic clinical pharmacology of vitamin E:** -

It prevents coronary heart disease, supports immune system, prevent inflammation, promotes eye health, lowers the risk of cancer; It is a powerful anti-oxidant thus reduces UV damage of skin, nourishes & protects the skin when applied on face; also promotes hair growth.

- **Vitamin D:** -

It is a fat soluble vitamin; it is a group of fat soluble secosteroids responsible for increasing intestinal absorption of calcium, magnesium, phosphate etc.

**Main sources of vitamin D:** -

It is present in olive oil, fish, liver, egg yolk, milk, salmon oil, orange, cereals, soy milk, legumes etc.

**Basic pharmacokinetics of vitamin D (based on human intake in natural food products):** -

It is absorbed in small intestines; it is mainly excreted in stools. All forms of vitamin D are biologically inactive (body cannot use it directly) & get activated in liver & kidney by some enzymes; it is mainly of 2 types, 1) Vitamin D3 (cholecalciferol) 2) Vitamin D2 (ergocalciferol). Both can be ingested from diet.

Vitamin D3 is naturally synthesized from cholesterol by skin on sun exposure (UVB short radiations). It is converted in liver into Calcifediol (25-hydroxycholecalciferol) & kidney converts it into Calcitriol & this is biologically active (usable by the body). Vitamin D2 is converted in liver into (25-hydroxyergocalciferol).

### **Basic clinical pharmacology of vitamin D:-**

It increases absorption in intestines of calcium, magnesium, phosphate & many other minerals; it acts on metabolism of calcium, phosphate thus promotes bone health & growth, promotes remodeling of bones in children; it reduces inflammation, improves cell growth, neuromuscular functions, immune function, prevents osteoporosis (pores in bones), rickets in children. Calcitriol binds with vitamin D receptors (VDR) which are mainly present in the nuclei of target cells. Its deficiency may cause rickets (mainly in children), weak bones, weakness in muscles, fatigue, headache, blood pressure, inflammation in mouth, skin pigmentations, obesity etc.

- **Sterols: -**

There are many times of phytosterols in extra virgin olive oil, research is on, the main types of phytosterols present in extra olive oil are beta sitostanol, delta 5 avenanasterol, campesterol etc; phytosterols present in extra virgin olive oil have little different structure comparing to other phytosterols thus making them more beneficial for heart health, reducing cholesterol absorption & various other health benefits.

### **Main sources of sterol: -**

It is present in olive oil, nuts, legumes, orange, wheat germ, wheat bran, fresh salad, vegetable oil etc.

### **Basic pharmacokinetics of sterols (based on human intake in natural food products): -**

They are absorbed in small intestines; it is in research & not known properly yet.

### **Basic clinical pharmacology of sterol: -**

It reduces absorption of cholesterol thus good for heart health.

- **Chlorophyll: -**

The green colour of olive fruit is mainly due to pigments of chlorophyll & yellowish colour due to carotenoid; the presence of chlorophyll-A make the extra virgin olive bluish-green colour & chlorophyll-B make the oil yellowish-green. Its atomic symbol is Mg, & atomic number is 12; its salts are essential in nutrition, required for activity of many enzymes, it is component of both intra & extra cellular fluids.

### **Main sources of chlorophyll: -**

Chlorophyll is present in olive oil, wheatgrass, broccoli, grapes, celery, peas, sprouts, dark leafy vegetables etc.

### **Basic pharmacokinetics of chlorophyll (based on human intake in natural food products): -**

It is absorbed in small intestines but little can be absorbed because it cannot resist long to get digested & is excreted in urine & stools.

### **Basic clinical pharmacology of chlorophyll: -**

Its deficiency causes irritability of nervous system, also causes vasodilation (dilate the blood vessels), tremors, depression, psychotic behavior. It helps the entire body to flush out toxins that can cause diseases, improves heart function, also helps in losing weight, reduces acne & pimples, and also prevents cancers, acts on skin & body healthy.

- **Carotenoid: -**

It is a fat soluble; it is also called as tetraterpenoid; it is an organic pigment produced in plants giving them bright red, yellow, orange etc colour. It helps the plant to absorb light energy for photosynthesis; it protects our body from diseases & maintains health. It is of more than 600 types of which 50 to 60 types are eaten in food by human. It is not made by our body we depend on food source to be eaten.

### **Main sources of carotenoid: -**

Carotenoid is present in olive oil, watermelon, tomato, kale, oranges, olive, carrot, plums, apricots, mango, sweet potato, kale, spinach, coriander etc.

#### **Basic pharmacokinetics of carotenoid (based on human intake in natural food products): -**

It is fat-soluble; It first gets emulsified followed by solubilized in micellar then require bile salts & absorbed in intestine, little is absorbed in stomach; it is excreted in stools (research is on), it is stored in body fats and will convert the stored carotenoid into vitamin A when needed by the body and use it.

#### **Basic clinical pharmacology of carotenoids: -**

It is converted into vitamin A in our body, it is essential for vision, immune system, prevents cardiovascular disease, it helps reducing inflammation, cancers risk.

- **Calcium: -**

It is natural essential mineral for the body, it is among the electrolytes of the body; its symbol is Ca & atomic no. 20.

#### **Main sources of calcium: -**

It is present in watermelon, quince, milk, banana, cheese, green leafy vegetables, soya beans, nuts, fish, meat, egg, bread, flour, yogurt, almonds, kale, soybean, spinach etc.

#### **Basic pharmacokinetics of calcium (based on human intake in natural food products): -**

Calcium is absorbed in duodenum & upper jejunum (when calcium intake is low) by transcellular active transport process, this depends on action of calcitriol & intestinal vitamin D receptors & when calcium intake is high, absorbed by paracellular passive process throughout the length of small intestine by 3 major steps, entry across the brush border, intracellular diffusion via calcium-binding protein & extrusion; Vitamin D is necessary for absorption of calcium, also vitamin C, E, k, magnesium & exercise increases the absorption of calcium. Also the level of calcium is regulated by calcitonin released by thyroid gland it reduces calcium level in blood when it is excessive & increases the excretion of calcium via kidneys; Parathyroid hormones (PTH) released by parathyroid gland increases the blood level of calcium when body need it or calcium is less in blood & promotes reabsorption of it in kidneys (calcitonin & PTH both have opposite function). Intestines can absorb 500 to 600 mg of calcium at a time; it is mostly stored in bone tissues & teeth & excreted in stool & sweat & little in urine depended upon the level of it in blood. Also estrogen act on transport of blood calcium in bones thus women mostly suffer from osteoporosis after menopause.

#### **Basic clinical pharmacology of calcium: -**

Calcium acts on bone health, communication between brain & other parts of the body, muscles contraction, blood clotting; it is a co-factor for many enzymes, it relaxes the smooth muscles & blood vessels; it maintains heart rhythm, muscles function; it is more needed in childhood & deficiency of it in childhood may cause convulsions (seizure); Excessive level of it in blood is called as hypercalcemia & may lead to kidney stone formation, heart attack, stroke, loss of appetite, excessive urination, memory loss etc; its low level in blood is called as hypocalcemia & may lead to cramps in the body, weak bones, weak teeth, numbness, tingling etc.

#### **Contraindication: -**

Sarcoidosis, excessive level of calcium in blood, very severe constipation, kidney stones, increased activity of parathyroid gland etc. Hypersensitivity of calcium, severe cardiac diseases, hypercalcemia, hypercalciuria, severe kidney stones etc.

- **Iron: -**

It is an essential mineral for our body; its symbol is Fe & atomic no. 26; it is an important component of hemoglobin (hemoglobin binds oxygen in lungs & supply it to whole body, it is oxygen carrier).

#### **Main sources of iron: -**

It is present in watermelon, quince, meat, dates, spinach, egg, nuts, dark leafy green vegetables, broccoli, pumpkin seeds, chicken, legumes, fish, banana, cabbage, kidney, almonds etc.

Meat is the best source of iron, it provides Fe+2 directly which can be transported from intestine to blood stream through Fe+2 transporter ferroportin (this binds with transferring & delivered into tissues).

#### **Basic pharmacokinetics of iron (based on human intake in natural food products): -**

The absorption of iron is not known fully; about only 10% of iron taken in food is absorbed; it is absorbed in duodenum & upper jejunum mainly & at the end part of ileum; low pH is needed for its absorption, after absorption it gets bind to transferring (each transferring can carry 2 atoms of iron); ceruloplasmin (protein) also helps in binding of iron; Hepcidin a hormone produced by liver is released when iron stores are full & inhibits iron transport & binding, thus reduces the absorption of iron; vitamin C & copper enhances iron absorption.

#### **Storage of iron: -**

Iron is stored in liver (in hepatocytes & Kupffer's cells) Kupffer's cells play an important role in recycling body iron, they ingest aged RBC liberate iron for it & reuse by breaking down haemoglobin. Little iron is stored in liver, heart, & kidneys in form of ferritin also little in bone marrow, spleen.

#### **Excretion of iron: -**

The body does not possess a physiological mechanism for regularly eliminating iron from the body because most of it is recycled by liver cells; iron is lost within cells, from skin & interior surface of the body (intestines, urine, breathe).

#### **Basic clinical pharmacology of iron: -**

It is an important component of Haemoglobin (haemoglobin binds oxygen in lungs & supply it to whole body); iron is beneficial for nails, hair, skin etc; it acts on blood production, its deficiency causes Anaemia (low haemoglobin level in blood) (this causes reduced oxygen carrying capacity & supply of it); most of the iron is present in haemoglobin, it consists of one heme (iron), one protein chain (globin) this allows it to bind & load oxygen from the lungs & supply it to whole body.

Unbound or free iron is highly destructive & dangerous it can trigger free radical activity which can cause cell death & destroy DNA.

- **Zinc: -**

It is a trace mineral; symbol is Zn & atomic no. 30; it is necessary for human body as it plays vital role in health.

#### **Main sources of zinc: -**

It is present in watermelon, quince, meat, fish, legumes, beans, egg, dairy products, seeds, nuts, whole grains etc.

#### **Basic pharmacokinetics of zinc (based on human intake in natural food products): -**

It is absorbed 20 to 40%, its absorption depends on its concentration & is absorbed in whole intestines (jejunum has high rate of its absorption) via carrier-mediated mechanism, it is released from food as free ions during digestion. Zinc from animal sources is easily absorbed comparing to plant sources. It is present in bile & pancreatic juices which is released in duodenum & is reused by the body this is called as endogenous zinc & zinc present in food sources is called as exogenous zinc. Its absorption depends on 2 proteins- Albumin & metallothionein. Albumin enables zinc to be transported from plasma into enterocytes. It is stored in muscles, bones mainly & little in prostate, liver, kidneys, skin, brain, lungs, heart & pancreas. It is excreted in stools 80% & rest in urine & sweat. Metallothionein binds to zinc to make it unavailable & excrete it in stools when zinc is excess in the body, & production of metallothionein is reduced when zinc is less in the body to make zinc available for the body.

#### **Basic clinical pharmacology of zinc: -**

It is necessary for immune system, prevents skin diseases, heal skin diseases, helps stimulate activity of at least 100 different enzymes in the body; it is required in little amount in the body, but children, pregnant & old aged need it more. It promotes growth in children, synthesize DNA & acts on wound healing, it is best in treating initial diarrhea & cold cough. It improves learning, memory, fertility etc. It heals acne, attention deficit hyper activity disorder (ADHD), osteoporosis, pneumonia etc.

- **Copper:** -

It is an essential micronutrient mineral; its symbol is Cu & atomic no. 29; there are lot of health benefits of it; it is needed in little amount in the body.

**Main sources of copper:** -

It is present in watermelon, quince, spirulina (water-plant), nuts, seeds, lobster, leafy green vegetables, guava, grapes, green olive, kiwi, mango, pineapple, pomegranate, egg etc.

**Basic pharmacokinetics of copper (based on human intake in natural food products):** -

It is absorbed 30 to 50%; it is absorbed easily than other minerals, its absorption depends on the copper present in the body, when the intake of it is less, absorption is increased & when intake is more absorption is less, it is mainly absorbed in small intestines & little in stomach via carrier-mediated process; its absorption is influenced by amino acids, vitamin C & other dietary factors. After absorption it is bound primarily to albumin, peptide & amino acids & transported to liver. Copper is secreted into plasma as a complex with ceruloplasmin. It is mainly stored in liver little in brain, heart & kidneys; it is excreted mainly in bile & little in urine.

**Basic clinical pharmacology of copper:** -

Together with iron it enables the body to form RBC; it helps to maintain health of bones, blood vessels, nerves & immune system; it also acts on iron absorption, protein metabolism, growth of body, it acts also on development of brain, heart & other organ; it is needed by the body for making ATP, collagen. Excessive of it may cause Wilson's disease.

**Deficiency of copper:** -

It is very rare; but may cause cardiovascular disease, genetic defects, inflammation of optic nerve etc.

- **Selenium:** -

It is an essential trace mineral, it is micro nutrient helpful to our body; its symbol is Se & atomic no. 34.

**Main sources of selenium:** -

It is present in quince, watermelon, fish, nuts, beef, chicken, mushroom, egg, grains, garlic etc.

**Basic pharmacokinetics of selenium (based on human intake in natural food products):** -

It is mainly absorbed in duodenum & proximal jejunum by active transport process; Dietary selenium is in 2 forms organic (selenoimethionine) it is 90% absorbed & inorganic (selenite) it is 50% absorbed; after absorption it is send in liver via portal veins, liver turns it into selenite & then is bound with selenoproteins & send into blood stream, gets in RBC, muscles, tissues etc; it is not distributed evenly in the body, liver has more of it; Vitamin E & other vitamins increases its absorption & both work as an anti-oxidant. Natural selenium remains in the body for less than 24 hours; it is stored in amino acid in skeletal muscles, little in liver, kidneys & pancreas; it is primarily excreted in urine, stool & expired in air via lungs very little in sweat & semen.

**Basic clinical pharmacology of selenium:** -

It is important for many body functions, immune system, fertility (both male & female); it contributes in thyroid hormone metabolism, DNA synthesis; it protects the body from oxidative damages & infection, it is found in tissues, skeletal muscles; it helps testes & seminal vesicles in their function; it reduces the risk of miscarriages, liver disease, cancer, asthma, cardio vascular disease; deficiency of it causes pain in muscles & joints, weaken the hair, nails, white spots on nails are found etc.

- **Vitamin B1 (Thiamin): -**

It is called as Thiamin also; it is a water soluble vitamin, it belongs to B-complex family, it is an essential micro nutrient which cannot be made by our body.

**Main sources of vitamin B1: -**

It is present in watermelon, spinach, legumes, banana, quince, wheat germ, liver, egg, meat, dairy products, nuts, peas, fruits, vegetables, cereals, rice, breads, oats etc.

**Basic pharmacokinetic of vitamin B1 (based on human intake in natural food products): -**

Intestinal phosphatases hydrolyze thiamin to make it free & absorbed in duodenum, jejunum mainly through active transport in nutritional doses & passive diffusion in pharmacological doses, very little is known about its absorption; it is metabolized in liver; it is excreted in urine & stored little in liver, heart, kidney, brain, muscles.

**Clinical pharmacology of vitamin B1: -**

It is needed for metabolism of glucose, amino acids (proteins), lipids (fats) etc; every cell of the body require it to form ATP (adenosine triphosphate) as a fuel for energy, also it enables the body to use carbohydrates as sources of energy; also nerve cells, heart cells, muscles cell require it to function normally; its deficiency causes beri-beri heart disease, weight loss, confusion, malaise, optic neuropathy, irritability, memory loss, delirium, muscles weakness, loss of appetite, tingling sensation in arms & legs, blurry vision, nausea, vomiting, reduce refluxes, shortness of breath etc; it is helpful to immune system; excessive intake of carbohydrates, protein, glucose (speacially in body builders, athletes etc) increases the need of vitamin B1.

- **Vitamin B2: -**

It is also called as Riboflavin, it is a water soluble vitamin, it is an essential micro nutrient, it helps many systems of the body; it is not synthesized in human body.

**Main sources of vitamin B2: -**

It is present in watermelon, liver, milk, dairy products, nuts, egg, fish, leafy vegetables, almonds, mushroom, lean meat and quince.

**Basic pharmacokinetic of vitamin B2 (based on human intake in natural food products): -**

It is phosphorylated in the intestinal mucosa during absorption; mainly absorbed in upper gastrointestinal tract; the body absorbs little from a single dose beyond of 27mg; when excessive amount is eaten it is not absorbed; very little is known about its absorption. The conversion of it into its coenzymes takes place mainly in cells of small intestines, heart, liver, kidneys & throughout the body in many cells; it is excreted in urine & stored little in liver, heart, kidneys & in tissues of the body.

**Basic clinical pharmacology of vitamin B2: -**

It is needed by the body to keep skin, eyes, nerves, red blood cells healthy, it also helps adrenal gland, nerve cells, heart, brain to function; it also act in metabolism of food, amino acids (protein), fats, helps to convert carbohydrate into energy (Adenosine triphosphate formation- the energy body runs on). It plays an important role in functioning of mitochondria.

Its deficiency is called as Ariboflavinosis & causes weakness, throat swelling, soreness of mouth & tongue, cracks on skin, dermatitis, anemia, weak vision, itching & irritation in eyes, migraine.

- **Vitamin B3: -**

It is called as Niacin or Nicotinic acid; it is in 2 forms niacin & nicotinamide acid; it is water soluble vitamin; it is an essential micro nutrient; it plays a role in over 200 enzymatic reactions in the body; It is produced in the body in small amount from tryptophan which is found in protein containing food & sufficient amount of magnesium, vitamin B6 & B2 (are needed to produce it).

**Main sources of vitamin B3: -**

It is present in watermelon, green peas, peanuts, mushroom, avocados, meat, egg, fish, milk, cereal, green vegetables, liver, chicken, coffee, potato, corn, pumpkin, tomato, almonds, spinach, enriched bread, carrots, quince etc.

#### **Basic pharmacokinetic of vitamin B3 (based on human intake in natural food products): -**

If eaten in natural form it is absorbed in stomach & small intestines by the process of sodium-dependent carrier-mediated diffusion in 5 to 20 minutes; if taken in therapeutic doses get absorbed by passive diffusion in small intestines. Its uptake in brain requires energy, in kidneys & red blood cells requires a carrier. It is metabolized in liver in 2 ways either is conjugated with glycine or niacin is formed into nicotinamide; it is stored little in liver unbound to enzymes. It is excreted in urine.

#### **Basic clinical pharmacology of vitamin B3: -**

It regulates lipid level in the body; it acts on carbohydrate to form energy sources for the body, it ease arthritis, boost brain function, every part of body needs it to function properly, it helps convert food into energy by aiding enzymes & cellular metabolism, it acts as an antioxidant. It prevents heart disease. Deficiency of it causes pellagra, high blood cholesterol, memory loss, fatigue, depression, diarrhea, headache, skin problems, lesion in mouth, tiredness etc.

- **Vitamin B5 (pantothenic acid): -**

It is also called as pantothenic acid, it is water soluble vitamin, it is a micro nutrient, it is necessary for making blood cells; acts to convert eaten proteins, carbohydrate, fats into energy; it is a component of coenzyme A; it is used in synthesis of coenzyme A. (coenzyme A acts on transport of carbon atoms within the cell).

#### **Main sources of vitamin B5: -**

It is present in watermelon, quince, meat, chicken, liver, kidney, fish, grains, milk, dairy products, legumes etc.

#### **Basic pharmacokinetic of vitamin B5 (based on human intake in natural food products): -**

It is converted into free form by intestinal enzymes & in nutritional doses it is absorbed in intestinal cells via sodium dependent active transport system in jejunum & pharmacological doses are absorbed by passive diffusion; after absorption the free form of it is now transported to erythrocytes via plasma, in cells pantothenic acid is converted into CoA, all the body tissues can convert it into CoA & ACP (acyl carrier protein), after these two complete their jobs they are degraded to form free pantothenic acid & other metabolites. It is excreted in urine & stools & little in exhaled in carbon dioxide.

#### **Basic clinical pharmacology of vitamin B5: -**

It promotes skin, hair & eyes health, proper functioning of nervous system & liver, formation of red blood cells, making of adrenal hormones, sex hormones; it is very helpful in constipation, rheumatoid arthritis, acne, allergies, asthma, baldness, colitis etc.

Its deficiency causes fatigue, nausea, vomiting, irritability, neurological weakness, numbness, abdominal cramps, sleep disturbances, hypoglycemia etc.

- **Vitamin B6: -**

It is also called as pyridoxine; it is involved in many aspects of macronutrients metabolism; it is present in many food products naturally.

#### **Main sources of vitamin B6: -**

It is present in watermelon, quince, chicken, bread, egg, vegetable, soyabean, whole grain cereals, brown rice, fish, legumes, beef, nuts, beans, liver, citrus fruits, starchy vegetables, potato etc.

#### **Basic pharmacokinetic of vitamin B6 (based on human intake in natural food products): -**

It is absorbed in small intestines, but before absorption a phosphate group has to be removed making vitamin B 6 in free form & absorbed by passive transport, now reaches liver via portal vein, in liver to get metabolized & flown into the blood stream it is bound with albumin & some are taken up

by red blood cells, once getting in blood it can function & promote health & it is excreted mainly in urine & little is excreted in stools, it is very little stored in tissues, muscle tissues, liver, brain, kidneys, spleen.

#### **Basic clinical pharmacology of vitamin B6: -**

It is needed for proper development & function of brain in children; it is needed for neurotransmitter, histamine, haemoglobin synthesis & function. It serves as coenzyme (cofactor) for many reactions in the body, it is the master vitamin for processing amino acids & some hormones, it is needed by the body to prepare serotonin, melatonin & dopamine, it is better to intake it during treatment of tuberculosis. It supports adrenal glands to function; it acts as a coenzyme in the breakdown & utilization of fats, carbohydrates, protein, it is important for immune system, it helps in treatment of nerve compression like carpal tunnel syndrome, premenstrual syndrome, depression, arthritis, high homocysteine level, diabetes, asthma, kidney stones etc.

Its deficiency causes seborrheic dermatitis (eruption on skin), atrophic glossitis with ulceration, conjunctivitis, neuropathy, anaemia etc.

- **Folate (vitamin B9): -**

Folate is an essential micro nutrient, it is a natural form of vitamin B9, it serves many important functions of the body, it plays an important role in cell growth & formation of DNA, RNA & other genetic material & helps in treating many diseases; its name is derived from Latin word *Folium*, which means leaf, leafy vegetables have it in good amount; Folic acid is a synthetic form of vitamin B9.

#### **Main sources of folate: -**

It is present in watermelon, quince, dark green leafy vegetables, fruits, nuts, beans, dates, seafood, egg, dairy products, meat, chicken, legumes, beetroot, citrus fruits, broccoli, spinach, cereals etc.

#### **Basic pharmacokinetic of folate (based on human intake in natural food products): -**

Its absorption is complicated because folate present in food are of many different forms, some of which cannot be absorbed until broken down by intestinal enzymes; it is not absorbed more than 50%; dietary folate contains glutamate that need to separate it from glutamate before absorption starts; It is absorbed in duodenum & jejunum, after absorption it is converted into tetrahydrofolate (the active form of folate), then a methyl group is added to it to form methyltetrahydrofolate; now the body uses it for various functions & metabolism; the body can store folate 20-70mg in liver which is enough for 3-6 months for the body; it gets excreted in urine & little in stools & bile.

#### **Basic clinical pharmacology of folate: -**

It is needed by the body to make DNA, RNA & other genetic material; it prevents many disease & conditions like anaemia, stroke, cardiac diseases, cancers, neurological diseases, macular degeneration (eye disease), palpitation, sores in mouth & tongue, hair fall, graying of hair. It is important in fertilization in male & female, essential during pregnancy to prevent neural tube defect in embryo (it is needed more), it protect us from free radicals & oxidation thus prevent cancers, it is essential in red blood cells formation, reduces high levels of homocysteine.

Its deficiency may cause anaemia, tiredness, palpitation, breathlessness, hairfall, neural tube defect in baby during pregnancy etc.

- **Vitamin B12: -**

It is called as Cobalamin, it is water soluble, it is involved in metabolism of every cell of body, it is a cofactor in DNA synthesis, myelin, fatty acids & protein, it is important for nervous system, it acts on red blood cell maturation; it is very less present in vegetables. When we eat animal source for it, B12 is protein bounded. Our body cannot produce it we need to consume it in food sources.

#### **Main sources of vitamin B12: -**

It is present in fish, meat, egg, milk, dates, organ like liver, kidney, olive fruit etc.

#### **Basic pharmacokinetics of vitamin B12: - (based on human intake in natural food products):**

It is absorbed in ileum (small intestine), when humans eat animal food the B12 is protein-bound. When the protein-B12 complex reaches the stomach, the stomach secretes acids and enzymes that detach the B12 from the protein. Then in a process unique to B12, another protein, R-protein (aka cobalophilin, haptocorrin, and transcobalamin picks up the B12 and transports it through the stomach and into the small intestine. R-protein is found in many fluids in the human body including saliva and stomach secretions. The stomach cells also produce a protein called intrinsic factor (IF), which travels to the small intestine. When the corrinoid-R-protein complex gets to the small intestine, the corrinoid is liberated from the R-protein by enzymes made by the pancreas. Of the liberated corrinoids, only the cobalamins attach to intrinsic factor. Intrinsic factor then carries the cobalamins to the last section of the small intestine, the ileum. The cells lining the ileum contain receptors for the cobalamin-IF complex. The cobalamin-IF complex protects the cobalamin against bacterial and digestive enzyme degradation. The IF-receptor also ensures that cobalamins will be given priority for absorption over non-cobalamin corrinoids. In addition to the IF mechanism, passive diffusion normally accounts for 1-3% of B12 absorbed when obtained through normal food sources. Some inactive B12 analogues are most likely absorbed through passive diffusion. It is metabolized in liver & excreted in urine. It is stored in liver for years mainly.

#### **Basic clinical pharmacology of vitamin B12: -**

It helps in formation of Red blood cells, prevent anaemia, prevent birth detect, promotes bone health, prevent osteoporosis, reduces risk of macular degeneration in eyes, improves mood & prevents depression, help nerve function & promote nervous health, boost energy, improves heart heath, nails, hairs, skin, memory, hormonal balance. It acts on wound healing, sooner recovery, ulcers, mouth ulcers etc.

Its deficiency causes anaemia, stress, weakness, stress, fatigue, delay wound healing, pain in nerves & tissues, joints, paleness, numbness in palms, feets etc. Diabetes & acidity medication reduces absorption of it in stomach & may lead to deficiency.

- **Vitamin A: -**

It is a fat soluble vitamin; it is group of unsaturated organic compound that includes retinol, retinal, retinoic acid & several provitamin A carotenoid. There are 2 types of vitamin A, 1) Vitamin A: - found in meat, poultry, fish & dairy products; 2) Provitamin A: - found in fruits, vegetables, plants; beta carotene is common type of provitamin A; it is an antioxidant, reduces wrinkles & repairs the skin damages; it is available in the market as tretinoin in tablets & creams to heal acne.

#### **Main sources of vitamin A: -**

It is present in watermelon, fish oil, carrot, green leafy vegetables, citrus fruit, sweet potato, spinach, kale, quince etc.

#### **Basic pharmacokinetic of vitamin A (based on human intake in natural food products): -**

It is absorbed in jejunum mainly, little through skin; metabolism is in liver & excreted in urine & stools, it is conjugated with glucuronic acid & then changed into retinal & retinoic acid; retinoic acid is excreted in stool, mainly. It is stored primarily as palmitate in Kupffer's cells of liver, normal adult liver stores sufficient amount of it which is enough for 2 years for the body, little is stored in kidneys, lungs, adrenal glands, fats, retina; it is excreted in urine & stools.

#### **Clinical pharmacology of vitamin A: -**

it is needed by the body for vision and maintains eye health speacially retina; it prevents night blindness; it helps in normal reproduction of cells thus prevents cancer; it is required for proper growth & development of embryo throughout the pregnancy period, it is good for skin, supports immune function; helps the heart, kidneys & lungs to work properly.

- **Potassium: -**

It is a mineral with symbol K & atomic number 19, it is an essential mineral which body cannot prepare; it is necessary for heart, kidney & other organs to function, its low level in body is called as hypokalemia & high level is called as hyperkalemia; it is mostly present inside the cells (intracellular); normal blood range is 3.5 to 5.0 milli equivalents per/liter (mEq/L).

#### **Main sources of potassium: -**

Potassium is naturally present in banana, orange, dates, raisin, broccoli, milk, chicken, sweet potato, pumpkin, spinach, watermelon, coconut water, white & black beans, potato, dried apricot, beetroot, pomegranate, almond, quince etc.

#### **Basic pharmacokinetics of potassium (bases on human intake in natural food products): -**

It is absorbed in small intestines by passive diffusion; it is stored mostly inside the cell, little in liver, bones & red blood cells. 80 to 90% potassium is excreted in urine & 5 to 20% is excreted in stools, sweat.

#### **Basic clinical pharmacology of potassium: -**

It is a mineral belongs to electrolytes of the body; it conducts electrical impulses throughout the body & assists blood pressure, normal water balance, muscle contraction, nerves impulse, digestion, heart rhythm, maintain pH balance. It is not produced in our body so we need to consume it through eating; Kidneys maintain normal level of it in the body by excreting excessive amount of it in urine or reabsorb it if the amount is less in the body so that the body may reuse it. Its deficiency may cause weakness, low blood pressure, constipation, nausea, vomiting etc.

Its normal amount in body keeps blood pressure normal; water balance in body normal; prevents heart disease, stroke, osteoporosis, kidney stone etc.

- **Carbohydrate: -**

It is a macronutrient needed by the body, the body receives 4 calories per 1 gram of it; carbohydrates includes sugar, glycogen, starch, dextrin, fibre & cellulose that contain only oxygen, carbon & hydrogen. It is classified in simple & complex; simple carbs are sugar & complex carbs are fibre & starch which take longer to digest. It is basic source of energy for our body.

#### **Main sources of carbohydrates: -**

It is present in watermelon (little), potato, sweet potato, bread, oats, butter, white rice, whole grain rice, pasta, lentils, banana, pineapple, quince etc.

#### **Basic pharmacokinetic of carbohydrate (based on human intake in natural food products): -**

Its digestion begins in mouth; salivary glands releases saliva & salivary amylase (enzyme) which begins the process of breaking down the polysaccharides (carbohydrates) while chewing the food; now the chewed food bolus is passed in stomach through food pipe (esophagus); gastric juice like HCL, rennin etc & eaten material are churned to form chyme in the stomach; the chyme now is passed little by little down into duodenum, pancreatic amylase are released which break the polysaccharides down into disaccharide (chain of only sugars linked together); now the chyme passes to small intestine, in it enzymes called lactase, sucrase, maltase etc breakdown disaccharides into monosaccharide (single sugar) & absorbed in upper & lower intestines, through villi present in small intestine & send into liver through venous blood present into portal veins, as per bodies need it is released in the blood stream & pancreas release insulin to use it as source of energy for the body, & extra is stored is converted into glycogen by liver & stored in liver & little is stored in muscles & tissues. Liver can reconverts glycogen in to sources of energy if body lacks for other source of energy, the undigested carbohydrates reaches the large intestine (colon) where it is partly broken down & digested by intestinal bacterias, the remains is excreted in stools.

#### **Clinical pharmacology of carbohydrates: -**

Carbohydrates are main sources of body energy, it helps brain, kidney, heart, muscles, central nervous system to function, it also regulates blood glucose, it acts on uses of protein as energy,

breakdown of fatty acids & prevent ketosis. If we eat less carbohydrate it may lead to hypoglycemia, ketosis, frequent urination, fatigue, dizziness, headache, constipation, bad breath, dehydration etc. Excessive intake of carbohydrates may lead to vascular disease, atherosclerosis (leads to narrowing of arteries, stroke, diabetes, obesity, fatty liver, blood pressure etc.

- **Sodium:** -

Here we are learning natural sodium, its symbol is Na & atomic no. 11; it is not produced in the body we need to take it in food sources; it is an important & essential mineral on which our body functions; it regulates blood pressure, blood volume etc.

**Main sources of sodium:** -

Excessive intake of sodium should be avoided; It has very less amount of sodium; vegetables & fruits have less sodium in them which is good for the body. It is present in beans, meat, fish, chicken, chilli, bread, rolls, milk, celery, beetroot etc.

**Basic pharmacokinetic of sodium (based on human intake in natural food products):** -

It is absorbed in ileum by active sodium transport because it is impermeable & in jejunum absorption takes place via mediated active transport & depends on levels of water, bicarbonate, glucose, amino acids etc; its absorption plays an important role in the absorption of chloride, amino acids, glucose & water; similar mechanism are involved in the reabsorption of it in kidneys when its level in the body falls. It is excreted mainly in urine, little in sweat & stools. It is stores in bones & dissolved in various body fluids.

**Basic clinical pharmacology of sodium:** -

It is amongst the essential electrolyte within the body, it remains in extracellular fluid (outside the cell) mainly, it carries electrical charges within the body, kidney maintain its normal level in the body, normal level is 135-145 milli-equivalent per liter (mEq/L), it is not produce in the body, it acts on muscles contraction, nerve cells, regulates blood pressure, blood volume; it takes part in every function of the body mostly, its low level in body is called as hyponatremia, it is found more in older aged, kidney disease, heart disease, hospitalized patient, this condition may cause brain edema, low blood pressure, fatigue, tiredness etc; its high level in the body is called as hypernatremia may cause increase in blood pressure, thirst, confusion, muscle twitching or spasm, seizures, weakness, nausea, loss of appetite, swelling in body etc.

- **Flavonols:** -

Flavonols are polyphenols & belong to class of flavonoids; they are colourless molecules that accumulate mainly in the outer & aerial tissues (skin & leaves) of the fruits & vegetables because their biosynthesis is stimulated by light so absent in inner parts of fruits & vegetables. There are more than 7000 flavonoids discovered yet & many more are to be discovered.

**Main sources of flavonols:** -

It is present in tea, leek, onion, broccoli, kale, berries, grapes, quince etc.

**Basic pharmacokinetics of flavonols (based on human intake in natural food products):** -

Its absorption, metabolism & excretion in natural form are not yet known & are under research. Flavonoids are mostly absorbed in small intestine, after absorption flavonoids conjugates with glucuronic acid or sulfate or methylation may occur; no free flavonoids are found in plasma or urine except catechin; the part of it which remains undigested is degraded into phenols in colon (large intestines) by microorganisms & absorbed, the absorbed part is further metabolized in liver; it is excreted via urine & bile.

**Basic clinical pharmacology of flavonols:** -

All types of flavonols are anti oxidant, anti inflammatory, anti cancer, reduce oxidative stress, maintains heart health, helpful in asthma, stroke, helps in regulating cellular signaling etc.

- **Beta carotene:** -

It is an anti oxidant that converts into vitamin A & plays a very important role in human health; it is responsible for the red, yellow, orange colouration in some fruits & vegetables. It promotes eye health & prevents eye diseases.

**Main sources of beta carotene:** -

It is present in pumpkin, carrot, sweet potato, dark leafy vegetables, apricot, red & yellow pepper, spinach, kale etc.

**Basic pharmacokinetics of beta carotene (based on human intake in natural food products):**

It is absorbed in intestine by passive diffusion & get converted into provitamin A in the presence of bile acids, the intestinal mucosa plays a key role in converting it into provitamin A. It is transported in blood plasma exclusively by lipoproteins. The complete absorption, metabolism & excretion is not known fully. It is stored in fats & liver.

**Basic clinical pharmacology of beta carotene:** -

It is anti oxidant, reduces risk of lung cancer & promote lung health, reduces free radicals thus prevents cancer & heart disease, diabetes, promotes skin health, improves complexion, hair health, eye health, brain health; reduces pimple, acne & other skin problems.

- **Lutein & zeaxanthin:** -

Both are important carotenoid found in nature, they are related with beta carotene & vitamin A, they give plants, fruits & vegetables yellow or red colour, they are absorbed best in human when taken with high-fat meal because it needs bile for digestion. Both are colour pigment found in human eye (macula & retina) they get deposited in macula & retina thus prevents many diseases of eyes.

**Main sources of both:** -

They are present in carrot, broccoli, kale, spinach, grapes, pumpkin, yellow vegetable, egg yolk, green leafy vegetable, orange, kiwi, corn etc.

**Basic pharmacokinetics of both (based on human intake in natural food products):** -

They are absorbed with the help of bile by mucosa of small intestine via passive diffusion & sent to the liver via lymphatic system & in liver it is incorporated into low density & high density lipoproteins & transported to target tissues (retina etc) by specific lutein binding protein mediates the selective uptake of it. The absorption depends on the amount & sources of intake; it is 70 % absorbed; it is excreted in bile & urine & stored in liver & adipose tissues of the body.

**Basic clinical pharmacology of both:** -

They are powerful anti oxidant, anti diabetic, anti cancer. They prevent age-related macular degeneration, cataract, retinitis pigmentosa, retinopathy, macular degeneration, they work as light filter & protect the eye tissues from sunlight damages, they block blue light from reaching the underlying structure in the retina of eyes thus reduces the risk of light induced oxidative damage that could lead to age-related macular degeneration (AMD).

They also prevent free radicals thus prevents colon cancer, cervical cancer, lungs cancer, breast cancer, prostate cancer, vision loss, improves mental function, respiratory infections, reduce high blood pressure, reduce soreness of muscles after exercise, reduce eye strain, controls diabetes, prevent heart diseases etc.

- **Beta-sitosterol:** -

It is among phytosterols & a main dietary phytosterol found in plants. It is anti cancer, anti inflammatory, it improves urine flow, reduces symptoms of heart diseases, reduces cholesterol, boost immune system, reliefs bronchitis, migraine, asthma, fatigue, rheumatoid arthritis, improve hair quality, reliefs prostate problems, improves erectile dysfunction, psoriasis, libido.

**Main sources of beta-sitosterol:** -

Canola oil, avocados, almond, soya bean oil, nuts, vegetable oil, dark chocolate, rice bran oil, wheat germ, corn oil, peanuts etc.

- **Glycerol:** -

It is also called as glycerine; it is a simple polyol compound, sweet in taste & non toxic. Vegetable glycerin is widely used in the food, cosmetics and pharmaceutical industries. For instance, it is often added to foods to help oil and water-based ingredients mix, sweetening or moistening the final product. Vegetable glycerin is particularly popular in the cosmetic industry but has several other uses as well. It may also provide health benefits, ranging from skin health to better hydration and a strengthened gut. Glycerin is a common ingredient in pharmaceutical drugs, including heart medication, suppositories, cough remedies and anesthetics. It is used in toothpaste, as it helps prevent the toothpaste from drying out or hardening in the tube. It is also used in soaps, candles, lotions, deodorants and makeup.

**Main sources of glycerol:** -

Olive oil, dairy products, cheese, protein food products, meat, rice, butter, nuts etc.

**Basic pharmacokinetics of glycerol (based on human intake in natural food products):** -

Glycerol is a precursor for synthesis of triacylglycerols and of phospholipids in the liver and adipose tissue. When the body uses stored fat as a source of energy, glycerol and fatty acids are released into the bloodstream. It is hydrolyzed by pancreatic enzyme lipase to release free fatty acids & monoglycerides; than emulsified with bile & absorbed in intestines. Before glycerol enters the pathway of glycolysis or gluconeogenesis (depending on physiological conditions), it must be converted to their intermediate glyceraldehyde 3-phosphate. The enzyme glycerol kinase is present mainly in the liver and kidneys, but also in other body tissues, including muscle and brain. In adipose tissue, glycerol 3-phosphate is obtained from dihydroxyacetone phosphate (DHAP) with the enzyme glycerol-3-phosphate dehydrogenase. It is stored in fats deposit of the body. It is excreted in stool & little in urine.

**Basic clinical pharmacology of glycerol:** -

Vegetable glycerin reduces intra ocular pressure & intra cranial pressure; may act as a moisturizer, reduce skin irritation, protect against infection and boost wound healing. It may also help relieve constipation and promote hydration and physical performance. Vegetable glycerin is a popular skincare treatment because of its moisturizing power. Research shows that applying glycerin to your skin may gradually improve its smoothness and suppleness. In fact, using creams containing glycerin may increase skin hydration in as few as 10 days. Vegetable glycerin may lead to better skin health by helping soothe skin irritation, protect against infection and promote wound healing. Studies show that applying glycerin-containing products may protect your skin against irritants and microbes, as well as soothe inflamed or wounded skin. Moreover, vegetable glycerin may act as a barrier to safeguard your skin from the elements, including wind and cold. Vegetable glycerin may provide some relief from constipation because it can draw water into your gut. This has a laxative effect, which helps digested food move through your gut more smoothly. For this reason, glycerin is often used as a suppository. Glycerin enema is more effective at relieving constipation than a liquid soap enema. Glycerin may also boost hydration, which can improve your athletic performance. Dehydration can greatly impair athletic performance, especially when sweat loss.

- **Oleuropein, hydroxytyrosol & oleocanthal:** -

They are phenolic bitter compound present in green olive, olive leaves, olive seeds, olive pill, olive pulp, extra virgin olive oil, argan oil etc. There are many health benefits of them like reduces cholesterol, reduces blood pressure, prevent cancer, anti cancer, anti inflammatory, anti oxidant, neuro-protective etc.

- **Cryptoxanthin:** -

It is a carotenoid; it is converted into vitamin A in human body & it is considered as provitamin A.

**Main sources of cryptoxanthin:** -

Red pepper, pumpkin, papaya, carrots, oranges, sweet corn, peaches, olive etc.

**Basic pharmacokinetics of cryptoxanthin (based on human intake in natural food products):**

To be absorbed it must be free from its food matrix, emulsified into oil droplets, then taken up by the cells of intestine by 2 mechanism one by facilitative transport assisted by enzymes next by epithelia transport also involved in cholesterol & lipid uptake, however in high pharmacological doses it is absorbed by passive diffusion; after absorption it is converted into vitamin A.

**Basic clinical pharmacology of cryptoxanthin:** -

It is antioxidant, prevents free radicals damage of DNA & other cells & stimulate repair of oxidative damages to DNA, anticancer, prevents osteoporosis.

- **Natural Chloride:** -

It is mostly found in table salt, sea water, vegetables & some fruits. It is important mineral which maintaining water balance & it essential component of gastric juices, we get is from food main in the form of sodium chloride (salt). It is among electrolytes of the body. It is mostly present in body fluids. It act on electric impulses of the body, it combines with hydrogen in the stomach to form hydrochloric acid (HCL) a power digestive enzyme. It is also a by-product of the reactions between chlorine & electrolytes such potassium, sodium, magnesium which are essential for human metabolism.

**Main sources of chloride:** -

Tomato, celery, olives, cabbage, broccoli, radish, cauliflower, potato, pepper, eggplant etc.

- **Amino acid in olive fruit it in little amount:** -

- **Arginine:** -

It is among conditional essential amino acid the body needs to function properly; it is made in liver; it plays an important role in building protein thus helpful in body building.

**Main sources of arginine:** -

Chicken, pumpkin seeds, spirulina, dairy products, red meat, fish, egg etc.

**Basic pharmacokinetics of arginine (based on human intake in natural food products):** -

It is absorbed in jejunum mainly from oral diet.

**Basic clinical pharmacology of arginine:** -

It releases nitric oxide in the blood & nitric oxide dilates the blood vessels thus increases the blood supply & controls high blood pressure, it improves erection, builds muscles etc. it also act on release of growth hormone, insulin & other substances in the body. It also improves heart health, athletes performance, stimulates immune system; citrulline present in watermelon is converted into arginine in kidneys, please refer lesson on watermelon.

- **Alanine:** -

It is a non essential amino acids that is present in blood plasma in its free state in high levels; it is involved in sugar & acid metabolism, protein synthesis, it increases immunity, provides energy for muscles tissues, brain & CNS, it act on tryptophan, vitamin B6 metabolism; it is an important sources of energy for muscles; it helps the body to convert simple sugar (glucose) into energy; it is produced in the body. It increases exercise capacity; reduces muscle fatigue, boost immunity, it is antioxidant; anti aging; increases muscle growth; ideal pre & post workout, reduce blood sugar, prevent liver disease, helps the liver to eliminate toxins, improves CNS functioning, helpful in benign prostate hypertrophy. It is digested in small intestine; it is converted into pyruvic acid by alanine

aminotransferase-1; during fasting condition alanine derived from protein breakdown is converted into pyruvate & used to synthesis glucose by gluconeogenesis in liver, it is excreted in urine via urea cycle. It is stored little in skeletal muscles.

**Main sources of alanine: -**

Meat, fish, egg, milk, aleovera, honey, black seeds, nuts etc.

• **Aspartic acid: -**

It is a non essential amino acid; it is over all negatively charged & plays an important role in synthesis of other amino acid, citric acid & urea cycles; it is found in animals, plants, sugarcane, sugarbeet. It may be a neurotransmitter; it strengthens the muscles, improves heart function, helps in maintaining mental health, reduces tiredness, improves athletic performance, increases muscle size, reduces depression & fatigue. It is absorbed in small intestine by active transport.

**Main sources of aspartic acid: -**

Meat, oysters, seeds, oats, avocado, sugar beet, milk, egg, nuts, cereals etc.

• **Glutamic acid: -**

It is a nonessential amino acid. It is an excitatory neuro-transmitter; it is necessary for biosynthesis of proteins; body uses it for several key functions within the body like making other neuro-transmitters such as GABA; it promotes brain health, muscles health, intelligence, mood & mental alertness. It is called as chemical messenger. It plays an important role in body's disposal of excessive waste like nitrogen. It is absorbed in lumen of small intestine into enterocytes by active transport & excreted in urine mainly. It is almost about 2 kilogram, storage in natural form in brain, kidneys, liver, muscles etc.

**Main sources of glutamic acid: -**

Meat, chicken, fish, egg, milk, wheat, mushroom, soy, broccoli, walnut, peas etc.

• **Glycine: -**

It is a nonessential amino acid that body needs for growth & maintainance of tissue & need to prepare hormones & enzymes. It is inhibitory neurotransmitter. It helps in preparing glutathione (a powerful antioxidant & reduces free radicals, delay aging). It is helpful in preparing of creatine (provides energy to muscles to perform exercise etc & acts on muscle contraction), beneficial for brain health, bone health, alzheimer's, schizophrenia, sleep disorder, stroke, burns, protects kidney & liver from harmful side effects of drugs used after organ transplant, heals wound & ulcers, it is anti inflammatory, improves skin health.

**Main sources of glycine: -**

Meat, fish, milk, legumes etc.

• **Proline: -**

It is a protein-genic amino acid used in biosynthesis of proteins. It heals cartilages, cushion joints, tendons, ligament, heart muscles, connective tissues & helps in formation of collagen.

**Main sources of proline: -**

Soy, pumpkin seed, lentils, black beans, quinoa etc.

• **Serine:-**

It is a nonessential amino acid, important for synthesis of protein, fats metabolism, muscle growth, immune system; it is a precursor of many amino acids, helpful in enzyme catalyze its reaction, overall health, physical & mental health.

**Main sources of serine: -**

Soybean, egg, lentils, meat, fish, nuts, almonds, walnut etc.

- **Tyrosine:** -

It is a nonessential amino acid; it is also called as 4-hydroxyphenylalanine; it is useful in cell synthesis of protein; it is a building block protein; body prepares it from phenylalanine. It is a precursor & used to produce noradrenalin, dopamine, & thyroxin & melanin hormones. It reduces stress, improves memory, it promotes growth, mental health, skin health, fat burn. It acts as a mood elevator, anti depressant, improves memory, mental alertness, its deficiency can cause hypothyroidism leading to low blood pressure, low body temperature (hypothermia), stress, fatigue, narcolepsy; it helps thyroid gland, adrenal gland, pituitary gland to function properly. It is absorbed in small intestine by sodium-dependant active transport; after absorption it reaches the blood & crosses the blood brain barrier (BBB) & enters the brain cells & gets metabolized into catecholamine (noradrenalin). Human body regulates it amount by eating it by food sources & making inside the body (nonessential). The body does not store it much for later uses.

**Main sources of tyrosine:** -

Meat, fish, egg, milk, nuts, beans, oats, wheat, black seeds etc.

**Dopamine:** -

It regulates reward & pleasure centers in brain; it is a chemical important for memory, motor skills & etc.

**Nor-adrenaline & adrenaline:** -

These hormones are responsible for fight & flight response in stressful situation & also controls many functions of the body; it is secreted by adrenal glands.

**Thyroxin:** -

It is secreted by thyroid gland; it regulates metabolism, blood pressure, digestion, energy etc.

**Melanin:** -

It is pigmented hormone, gives our skin, hair, eye their colour; dark skinned people have more melanin in their skin than light skin people (depend on exposure to sunlight).

- **Valine:** -

It is an essential nutrient for vertebrates, biosynthesis of protein; it is an aliphatic & extremely hydrophobic essential amino acid; it is branched chain of amino acid (BCAA); it is important for growth, repair, blood glucose regulation, for energy; it stimulates CNS, proper mental function.

**Main sources of valine:** -

Cheese, soy, beans, nuts, fish, meat, chicken, mushroom, seeds, nuts, whole grains etc.

- **Histidine:** -

It is an amino acid used in biosynthesis of protein; it is semi essential amino acid, needed by human for production of histamine & also for growth & tissue repair, it is helpful in maintaining myelin sheaths that covers the nerves & protects the nerves.

**Main sources of histidine:** -

Meat, mutton, fish, milk, egg, seeds, nuts, chicken, cheese, soy, beans, whole grains, fenugreek seeds.

**Basic pharmacokinetics of histidine (based on human intake in natural food products):** -

It is absorbed in small intestine via active transport requiring the presence of sodium.

**Basic clinical pharmacology of histidine:** -

It plays many roles in immunity, gastric secretion & sexual functions. It is also required for blood cell formation & protects tissues against damage of radiation & heavy metals. It keeps normal pH of 7 in the body, useful in rheumatoid arthritis, allergy, ulcer & anemia caused by kidney failure or dialysis. It is an antioxidant, anti inflammatory, reduces cholesterol.

- **Phenylalanine:** -

It is an aromatic essential amino acid in human; it plays a key role in biosynthesis of other amino acids; it is important in the structure & function of many proteins & enzymes. It is precursor of melanin, dopamine, noradrenalin hormone, thyroxin hormone. It is converted in tyrosine & used in biosynthesis of dopamine & noradrenalin. It improves memory, reduces pain of hunger; it is anti depressant; it is also a building block protein; it is useful in vitiligo, depression, ADHA, parkinson's, multiple sclerosis, pain, osteoarthritis, rheumatoid arthritis, fat burn & helpful in alcohol withdrawal symptoms.

**Main sources of phenylalanine:** -

Pumpkin seed, nuts, seeds, soy, meat, fish, chicken, egg, beans, milk etc.

- **Methionine:** -

It is a sulfur containing amino acid; it is essential; it plays a critical role in the metabolism & health; it acts on normal cell functioning, growth & repair. It is also a chelating agent for heavy metals; due to its sulfur contain it is helpful in hair, nail health & growth & good for skin health; it reduces cholesterol by increase the production of lecithin in liver & reduces fats formation in liver, also protects kidneys, liver from hepatotoxins, it is an antioxidant. It is absorbed in lumen of small intestines into enterocytes by active transport & metabolized in liver.

**Main sources of methionine:** -

Meat, mutton, fish, chicken, cheese, egg, beans, milk, nuts, shellfish etc.

- **Isoleucine:** -

It is an amino acid that is used in the biosynthesis of proteins, it is an essential amino acid means the body cannot make it & we depend on food sources, it plays & helps many functions of the body.

**Main sources of isoleucine:** -

Meat, mutton, fish, cheese, egg, seeds, nuts, soybeans, milk, legumes, fenugreek seed etc.

**Basic pharmacokinetics of isoleucine (based on human intake in natural food products):** -

It is absorbed in small intestine by sodium-dependant active transport. It is metabolized in liver.

**Basic clinical pharmacology of isoleucine:** -

It promotes glucose consumption & uptake, it is anti-catabolic, enhances athletic performance & best for pre-workout, it acts on wound healing, detox of nitrogenous waste in the body, stimulates immune system, promotes secretion of many hormones, helps in haemoglobin formation, regulating blood glucose, energy in the body, built muscles, helpful to brain for its function.

- **Leucine:** -

It is branched chain amino acid (BCAA) it is ketogenic amino acid; it is necessary when we do exercise, it stimulates protein synthesis & assists in muscle building.

**Main sources of leucine:** -

Cheese, soyabean, meat, nuts, chicken, seeds, fish, seafood, beans.

**Basic clinical pharmacology of leucine:** -

It helps regulate blood glucose, promotes growth, recovers the muscles & bone tissues, acts on production of growth hormones, repairs the tissues, essential for muscle building, it burns fats, controls obesity, promotes lean muscles growth.

- **Lysine:** -

It is an essential amino acid, which our body cannot prepare and we need to eat it from food sources. It necessary for many body functions, acts in building blocks of protein (muscles).

### **Main sources of lysine: -**

Red meat, chicken, egg, fish, beans, lentils, wheat germ, nuts, soybeans, spirulina, fenugreek seed, shrimp, pumpkin seed, tuna, cheese, milk etc.

### **Basic pharmacokinetics of lysine (based on human intake in natural food products): -**

It is absorbed from the lumen of the small intestine into the enterocytes by active transport, it undergo first pass metabolism in liver & is metabolized in liver.

### **Basic clinical pharmacology of lysine: -**

It helps the body in tissue growth, repair muscles injury, promote collagen formation, help the body to produce enzymes, antibodies, hormones, supports immune system, its deficiency causes fatigue, irritability, nausea, hair loss, anorexia, inhibited growth, anemia, problems with reproductive system, it is very helpful in treating cold sores (herpes), control blood pressure, diabetes, osteoporosis, helps athletes performance, helpful in treating cancers, reduces anxiety, increase absorption of calcium, improves digestion & prevent leaky gut, helpful in pancreatitis.

- **Gross basic pharmacokinetics of olive oil based on human intake in natural food products: -**

As the olive oil is consumed specially oral alone or with some eatable or food cooked with it (but mainly alone on empty stomach) it first gets hydrolysis (means breakdown of compounds due to reaction of water) in the stomach & duodenum. Then pancreatic juices, gastric juices & bile (from gall bladder) leads to lipolysis (breakdown of fats & lipids to release fatty acids), then the substance get emulsified (it is mixing of 2 or more liquids mix together to form a thick liquid) now digestion starts in the jejunum (upper small intestine) followed by digestion in ileum (lower small intestine) now the digested material is send to liver through portal veins for metabolism. Extra virgin olive oil needs less gastric juices & pancreatic juices because it is rich in natural digestive enzymes & get digest better in proper time without giving load on gastric organs.

Olive oil does not reduces tone of sphincter at the upper end of the stomach thus prevent gastroesophageal reflux disease (GORD) (reflux back of eaten food into food pipe); It partially inhibits the gastric motility (movements) & due to this, content of stomach (eaten food processed) are released slowly & gradually in duodenum (giving a feeling of fullness in stomach) by this digestion take place properly and less gastric & pancreatic juices are released giving less load on the digestive organs & helpful in all pancreatic diseases.

Olive oil acts on optimal bile drainage & full emptying of gall bladder by acting on contraction of gall bladder thus prevents gall stones & gall bladder disease, it also acts on synthesis of bile salts in liver & increase the amount of cholesterol excretion by liver; thus improves function of liver & gall bladder.

Olive oil produces digestives juice naturally same as produced by pancreas thus give rest to pancreas & prevent pancreas disease; it reduces the absorption of cholesterol in the intestine & increases the absorption of calcium, iron, magnesium & other nutrients. It is very well digested & help in constipation due to mild laxative properties & stops bad breath. It takes about 5 to 10 hours to fully digest depending the mode & amount of intake.

- **Excretion: -**

It is excreted about 62% in urine & 38% in stools. Hydroxytyrosol present in olive oil is a powerful anti-oxidant is excreted mainly in urine as glucuronide-conjugate. It is excreted about 90% in urine, 5% in stools.

- **Metabolism: -**

Metabolism of olive oil is in liver (it is under research and not known fully).

- **Organ: -**

In research it is found that the radio-labeled oleic acids present in olive oil reaches the heart, liver, lungs, spleen, kidneys, muscles, intestine, adrenal glands & dental tissues; Oleic acid is primarily transported via lymphatic system of the body. It also penetrates through skin.

- **Plasma Half life:** - It is yet not clear and research is going on.
- **Contraindications:** -

Allergy to olive oil (it is very rare).

- **Conclusion:** -

Olive is mentioned as MUBARAK by its CREATOR ALLAH and in HADITH also, please admire the health benefits & importance of olive oil mentioned above, it is beneficial for whole body to keep us healthy and disease free, also prevents & heal many diseases. It is amongst the best natural products & easily available.

Use it regularly in eating & massaging. Health benefits of it cannot be compared with any medicinal products or eatables. Combining it with honey make the world best natural product for health & healing the diseases. It is suitable to all age all season. Use with vegetables or fruits salad as a dressing oil, cook food in it, it seems to be costly but reduces medical expense & other expenses regarding health thus is cheaper economically.

Also massage with it once a week or once in 15 days whole body at night and bath with warm water in the morning, bath with sidr leaves (jujube) water, means boil water with some sidr leaves (jujube leaves) and pour this boiled water in your bathing water.

Apply its oil on face for complexion 5 times a week at night; mixe some cucumber or watermelon in extra virgin olive oil prepare a paste and apply on face for 30 minutes and wash with luke water. Come let's use it & teach others this valuable herbal medicine of Prophetic medicine.

#### Olive oil nutritional facts.

|                               |           |           |           |             |    |
|-------------------------------|-----------|-----------|-----------|-------------|----|
| 100gram has 884 calories.     | Vitamin A | 0%        | Vitamin C | 0%          |    |
| <b>Total Fat</b> 100 g        | 153%      | Calcium   | 0%        | Iron        | 3% |
| Saturated fat 14 g            | 70%       | Vitamin D | 0%        | Vitamin B-6 | 0% |
| Polyunsaturated fat 11 g      |           | Cobalamin | 0%        | Magnesium   | 0% |
| Monounsaturated fat 73 g      |           |           |           |             |    |
| <b>Cholesterol</b> 0 mg       | 0%        |           |           |             |    |
| <b>Sodium</b> 2 mg            | 0%        |           |           |             |    |
| <b>Potassium</b> 1 mg         | 0%        |           |           |             |    |
| <b>Total Carbohydrate</b> 0 g | 0%        |           |           |             |    |
| Dietary fiber 0 g             | 0%        |           |           |             |    |
| Sugar 0 g                     |           |           |           |             |    |
| <b>Protein</b> 0 g            | 0%        |           |           |             |    |

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**Research:** -

#### **SCIENCE & HADEES REGARDING OLIVE & QUST: -**

##### **Olive medicinal uses:** -

Nabi ﷺ recommended the use of olive oil in Pleurisy. Keeping this in view olive oil was administered in various diseases of Respiratory tract and it was observed that the regular use of olive oil was affected in common cold and coryza and pneumonia.

The medicinal and cosmetic uses of olive products are truly astounding. The oil is extremely nutritious and is recommended by dieticians to "improve the balance of fats within the blood" (Adams, 2001) as well as in lowering cholesterol levels. Since the 1950s, the benefits of the Mediterranean diet, rich in olive oil, have been extolled. While it has always been promoted as being beneficial in lowering cholesterol levels, it is now increasingly being linked to lowering blood pressure.

A study by Dr. Ferrara and his colleagues of the Federico II University of Naples, Italy (Ferrera et al., 2000) compared the effects of two similar low-fat diets on the blood pressure of hypertensive patients. One diet was enriched with extra virgin olive oil, high in monounsaturated fatty acids while the second was enriched with the same amount of sunflower oil with a high content of polyunsaturated fatty acids. The patients on the former diet, all hypertensive, showed significant reductions in their blood pressure, thereby indicating that a diet, rich in olive oil, is not only associated with lower levels of cholesterol, but with lower blood pressure as well. The DASH (Dietary Approaches to Stop Hypertension) eating plan, which promotes a diet low in sodium and high in unsaturated fats, also recommends olive oil (National Heart, Lung and Blood Institute, 2003).

Another medical benefit of olive oil relates to the maintenance of a healthy digestive system. Oxford University's Institute of Health found that "olive oil may have a protective effect on the development of colorectal cancer" (Stoneham et al., 2000).

Olive oil has traditionally been used to prevent constipation, assist in 'cleansing' of the gallbladder and in treating various ailments related to skin problems such as burns, scratches and sunburn (Cook, 1934). Cook, writing in the 1930s, said that, "Those who recognize its wonderful medicinal properties and the many uses to which it can be put will never fail to keep a bottle of pure olive oil in the house." Olive oil is also applied to the skin as it brightens the complexion, softens the skin and is used in the treatment of eczema and psoriasis. It is also used on the hair, especially problems relating to "dry hair and flaky scalp" (Adams, 2001). Furthermore, olive oil is used for massage and as carrier oil when blending essential oils. The leaf of the olive tree is commonly used by herbalists for its antiviral properties. It has been traditionally used to cool fevers by boiling the leaves and concocting a tincture that is then taken orally (Privitera). Olive leaf was not only used to treat severe cases of fever, but tropical diseases such as malaria as well. Today, olive leaf extract is available from natural health practitioners and taken orally in a tablet form.

##### **Olive oil:** -

The studies found that people who regularly consume olive oil are much less likely to develop cardiovascular diseases, including hypertension (high blood pressure), stroke, and hyperlipidemia (high blood cholesterol and triglyceride levels). Regular olive oil intake helps reduce inflammation, endothelial dysfunction (problems with the inner linings of blood vessels) thrombosis and carbohydrate metabolism.

##### **Olive oil helps prevent stroke:-**

Dr. Cécilia Samieri, from the University of Bordeaux and the National Institute of Health and Medical Research (INSERM) in Bordeaux, France, and colleagues reported in the journal Neurology that olive oil may prevent strokes in older people & frying with olive oil does not raise heart disease risk. The team found that older people who regularly used olive oil for cooking and salad dressing or with bread had a 41% lower risk of stroke, compared with their counterparts who never consumed it. Dr. Samieri said, "Stroke is so common in older people and olive oil would be an inexpensive and easy way to help prevent it."

##### **Olive oil may reduce breast cancer risk: -**

A team of scientists at the Universitat Autònoma de Barcelona in Spain found a key mechanism by which virgin olive oil protects the body against breast cancer, in contrast to other vegetable oils. Also very much helpful in cholesterol levels, Alzheimer's disease, acute pancreatitis, protects the liver, ulcerative colitis.

Olive oil acts healing on acne and other skin conditions. However, one study noted that squalene, which is in olive oil, may contribute to relief of seborrheic dermatitis, acne, psoriasis or atopic dermatitis. One laboratory study reported that a mixture of honey, beeswax, and olive oil inhibited the growth of *Staphylococcus aureus* and *Candida albicans*, with the

same mixture reducing the discomfort of hemorrhoids and anal fissures in adults. It is very much beneficial for massaging infants and toddlers.

**Olive oil in metabolic syndrome:-**

The metabolic syndrome is a combination of abdominal obesity, high blood pressure, abnormal cholesterol, and high blood sugar. "Metabolic syndrome is connected to the obesity epidemic of our time, a big belly poisons our metabolism and a poisoned metabolism can result in type 2 diabetes, heart attacks, stroke, or sudden death," a leading researcher reported.

Olive oil which is rich in oleic acid, a mono-unsaturated fatty acid, and contains several bioactive compounds such as antioxidants, high in phenolic antioxidants, Saturated Fat: 13.8%, Monounsaturated Fat: 73% (most of it the 18 carbon long oleic acid), Omega-6: 9.7%, Omega-3: 0.76%, Vitamin E: 72% of the RDA, Vitamin K: 75% of the RDA, oleocanthal, as well as oleuropein (antioxidants & anti-inflammatory). Some people have criticized olive oil for having a high Omega-6 to Omega-3 ratio (over 10:1), but keep in mind that the total amount of polyunsaturated fats is still relatively low, so this shouldn't be a cause for concern.

Qust (costus) & Zait (olive oil) use together: -

Qust is an anti-bacterial herb with a very good effect & olive oil increases its medicinal actions & both enhances act of each other.

**A research on Qust (costus) for pleurisy (zatul Jamb) & other lungs disease: -**

Anti-bacterial effect of Indian costus (Qust ul Hind) and sea-Qust and their water extracts on some pathogenic bacteria of the human respiratory system AL-Kattan, Manal Othman Faculty of Science (Girls), Department of Microbiology, King Abdul Aziz University, Jeddah, Saudi Arabia (Accepted on 4 May, 2012). The pathogenic bacteria of the human respiratory system are characterized by resistance to most antibiotics. *Staphylococcus aureus* and *Klebsiella pneumonia* are some of the pathogenic bacteria of the human respiratory system which often cause pneumonia, pleurisy and meningitis. Moreover, they are the most prominent strains of bacteria in most hospitals.

Bacterial resistance to antibiotics occurs as a result of excessive usage of antibiotics in the treatment of diseases. For that reason, it is necessary to seek for medical alternatives that are safer for the treatment of these bacteria. Alternative medicine, especially, has revealed many plants and herbs that are used in the treatment for some diseases including respiratory diseases. The purpose of this study is to determine the effect of the Indian Costus and sea-Qust on the pathogenic bacteria; *Escherichia coli*, *Pseudomonas aeruginosa*, *S. aureus* and *K. pneumonia*. In addition, the effect of the water extracts of the Indian costus and sea-Qust on *S. aureus* and *K. pneumonia* was also determined.

**Result of the research: -**

The results showed antibacterial effect of two types of dried Costus roots on all tested bacteria, especially in high concentrations. Also, the cold or hot water extract of Indian Costus was highly effective against tested bacteria at 20 to 25% concentration, while the hot extract of sea-Qust was more effective against tested bacteria than its cold extract in all the concentrations used.